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Accidental stab by glass bottle-a case report

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Abstract

Individuals who undertake criminal activity are often at risk of injury for a variety of reasons. The reported case is of a 10 yrs old child who was running from police holding a broken glass bottle and accidentally stabbed himself. Critical location of wound site over major vessels resulted in rapid bleeding. In addition, adrenergic effects of being engaged in illegal activities, and the subsequent pain from the wounds, may also have contributed to accelerated heart rate and blood loss. Failure to appreciate the potential effects of such wounds, which may initially have appeared relatively minor based on their small size, added to an impaired ability to apply first aid or seek appropriate medical assistance, may also have been due to the concerns regarding the illegal nature of the underlying activity.

Key Words

Illegal activity; Accidental; stab wound; glass bottle; death.

Case report

The represents a 10 yr old boy who was a member of a juvenile gang which was indulged in illegal activities near railway station. On the night of incident they tried to rob a person using knives and broken glass bottles as weapon of threat. The person raises alarm which caught the attention of nearby patrolling police personals. A chase ensues in which the boy accidentally fell and got stabbed by the broken glass bottle he was carrying in his hand. He was taken by the police to the nearby hospital where exploratory laparotomy was performed. He later succumbed to his injuries and the body was sent for autopsy.

On external examination, a laparotomy stitched wound of 17cm present over front of abdomen in midline. Another stitch wound present over lower front of right side of abdomen, 3.5cm, with its medial end merging with lower end of laparotomy wound (fig 1).

Fig. 1: Showing sutured stab(a), laparotomy(b) and drainage(c) wounds.



On removal of stitches, the margins were smooth and easily separable. The track of wound extends downwards, medially and backwards. At the end of the track, stitches were present over right external iliac and right testicular arteries indicating being cut due to stabbing (fig 2).

Fig. 2: Sutured right external iliac artery indicated by a pointer (a) and right testicular artery (b).



There was about 1 litre of blood in the peritoneal cavity. The cause of death attributed to haemorrhagic shock due to stab by sharp object which during investigation revealed to be a broken glass bottle.

Discussion

Perpetrators of criminal activities are often placed in at-risk situations because of violence associated with certain forms of felonies. Illegal activities involving firearms may lead to injury or death if there is police involvement. This may take the form of wounding by police in an attempt to either stop a perpetrator fleeing a scene or to prevent a perpetrator firing at police or harming other individuals, such as hostages. Injuries may also be sustained in falls from buildings if a perpetrator slips while trying to exit, or jumps from a height in an attempt to avoid police capture. Traumatic asphyxia has been reported in an individual who became wedged in an upper window while trying to escape from a robbery scene.¹ Death or injury may also result from high-speed motorvehicle crashes when perpetrators are fleeing from a crime scene. Blunt-trauma injuries may occur if attempts are made to apprehend perpetrators, either by police or concerned citizens. Less commonly, deaths may occur from inhalation of products of combustion if an individual becomes trapped inside a building to which he has set fire in an attempt to disguise a break and enter. One such case in South Australia involved a victim who had crawled into the roof space of a building after setting a fire, only to be overcome by smoke. Fire investigators evaluating the scene of the suspicious fire were suitably surprised to find a body wedged inside the roof space when they were carrying

out their investigations. The possibility of a concealed homicide must, of course, be considered under such circumstances. Restraint, particularly if associated with an excited delirium, may also result in sudden death due to a variety of mechanisms.² Acutely psychotic individuals apprehended at crime scenes who have been struggling violently may suddenly collapse and die. The cause of this is uncertain but is believed to result from the effects of alcohol and/or drugs combined with high levels of adrenaline, resulting in lethal cardiac dysrhythmias. The autopsy examination is usually uninformative, apart from minor abrasions and injuries associated with the terminal struggle. Restraint by police or others in isolation may also cause unexpected death. This may simply have resulted from traumatic or crush asphyxia due to a number of individuals lying on top of a victim in an attempt to subdue him or her. Although the typical autopsy findings of crush asphyxia include marked congestion of the head, neck, and conjunctivae with subconjunctival hemorrhages, numerous facial and conjunctival petechiae, and bleeding from the nostrils, these may not be so obvious in cases where compression was only transitory. So-called choke/carotid holds or arm locks describe situations where an arm or baton has been used to compress the neck of an individual being restrained. Two types of neck holds have been described: the "bar arm" control, in which an arm, baton, or flashlight is brought directly across the front of the neck occluding the airway; and the "carotid sleeper," in which a flexed arm compresses the carotid arteries bilaterally.^{3,4} Incapacitation is probably caused by a combination of factors, including bradycardia from stimulation of the carotid sinus reflex, cerebral ischemia from compression of the carotid arteries, and hypoxia due to airway occlusion. Death may occur with any of these types of restraints, and autopsy findings may include marks on the anterior aspect of the neck and occasionally fractures of the hyoid bone or laryngeal cartilages.⁵ Deaths have also occurred from underlying natural diseases exacerbated by the stress of illegal activities. This applies particularly to atherosclerotic cardiovascular disease but is more usual in victims of an attack or robbery. Conditions such as myocarditis and asthma need to be carefully checked for at autopsy. In a retrospective study of 10 years by Joseph A. Prahlow only 5

cases of accidental fatalities by glass were observed and inscribed wounds were observed in all of them.⁶ It itself indicates the rarity of such incidents. Another study reports three cases of fatal domestic accidents by falling through glass doors.⁷ Multiple cuts and stabwounds in one of these cases primarily suggested a crime of violence. In contrast the bodies of the two other perished persons showed only insignificant injuries. Causes of death were atherosclerosis (1 case) and mechanical bleeding to death (2 cases).

In contrast to the above situations, the reported case demonstrates an unusual scenario wherein the child involved in robbery, using broken glass bottle as a weapon of threat, accidentally sustained stab wounds which led to fatal outcomes. Victims under such circumstances may hesitate to seek help, given the illegal nature of their activities. In summary, the reported case demonstrates about an individual who died of accidentally inflicted stab wound after attempting to run from the police personnel. In addition, adrenergic effects of being engaged in illegal activities, and the subsequent pain from the wounds, may also have contributed to accelerated heart rate and blood loss.

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Accidental stab injury with a broken glass piece due to fall on 'T' Poi from caddle- A case report

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Abstract

Punctured or stab wounds are popularly called stabs and are termed penetrating wounds, when passing through tissues, they enter a cavity of the body such as the thorax and abdomen. A stab wound caused by a sharp, pointed and cutting instrument has clean – cut edges, which are almost parallel but slightly curved to each other like an ellipse and have sharp angles at the two extremities. In the present investigation a boy aged about 2 1/2 year was found dead in living hall in the Kondaveedu apartment, Abdullah khan estate Kurnool (Plot no:202)(A.P) India. Concerned Crime no: 13/10 U/s 174 Crpc (Accidental death due to fallen on broken glass pieces) of Kurnool II town P.S on 27-03-2010 at 15:00 hours.

Key words

Glass Pieces, Characters of Stab injuries, Autopsy Findings.

Introduction

STAB WOUNDS (PUNCTURE WOUNDS)

Definition

A stab wound (Puncture) is defined as an injury, caused by a sharp pointed weapon/object, when the sharp tip is thrust into the body part (stab wound can result, even if the point is blunt eg:by horn of a bull or end of an iron rod).

Examples of sharp pointed weapons: Knife, gupti, Dagger, sword, ice Pict, spear, Arrow & bayonet, Sharp glass piece etc.

Types of stab wounds:

1. Incised puncture wound
2. Penetrating wound
3. Perforating wound
4. Concealed puncture wound

Fig. 1: Scene of crime



Puncture Wound: Any wound, where depth is the greatest dimension and it is caused by a sharp pointed object, it is stab incised punctured wound.

Penetrating wound: When the sharp point of the object penetrates into one of the three body cavities, it is a penetrating wound.

Perforating wound: If the sharp tip of weapon perforates the part through and through, so as to cause a wound of entry and wound of exit, it is labeled as perforating wound.

Concealed puncture wound: i.e. a puncture wound which is concealed or hidden. Punctures by thin and sharp pointed object, like pin, needle, nail, ice pick, screw driver, scissors etc. In the fonta nallae, inner can thus of eye, upper eye lid, ears, up the nose, down the throat, in folds of neck or axilla, under the breast, in umbilicus, urethra, vagina or rectum. They are not easily such on examination. They are almost always homicidal.

Case history

Inquest held over the dead body of the deceased MallaReddy gari.Kushal aged 2 1/2 years an American citizen. S/o M.Ramesh Kumar Reddy Resident of RHODE, ISLANDS, 109 HENRY B RIORDAN WAY NORTH ATTLE BIOROMA -02760 MASACHUSETTS, USA Temporarily comedown to Kurnool and Residing in Flat No: 202 Kondaveedu Apartments, Abdullah khan Estate Kurnool(A.P) India, concerned in Crime No: 113/ 10 U/s 174 Crpc (Accidental death due to fallen on broken glass pieces) of Kurnool II town P.S. on 27/03/10 at 15:00 hours.

Autopsy findings

External appearances

1. Body is dressed in orange colour company made T shirt

Fig. 2: Glass piece

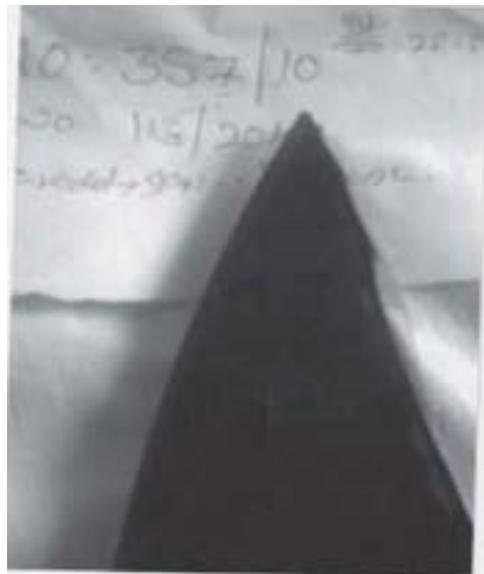
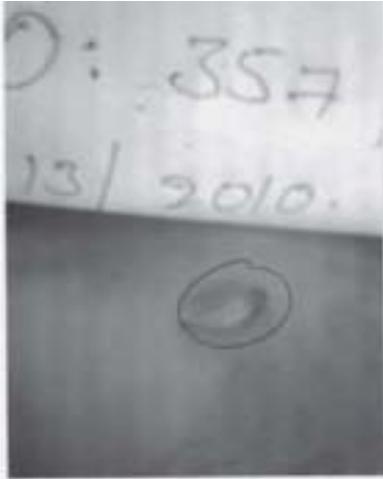


Fig. 3: Injury to the Sternum



Fig. 4: Glass piece injury to the chest



with U.S. POLOASSN label at the middle part of the collar at its back of neck site, partly soaked in blood and tare of 2x1 cm with irregular margins placed over right side front of the chest at its middle part, adjacent to midline and margins were stained with blood and dimension of the injury present over the left side anterior chest wall.

2. Black, Blue, cream colour checks designed short, intact and blood stained. White colour with nappy pad with elastic waist belt, intact and anterior and upper border of the nappy pad is soaked with blood corresponding with infra umbilical and supra pubic region.
3. Two rows of red waist thread intact.

Antemortem injuries

The following ante mortem external & internal injuries were found over the male child dead body are

1. Stab injury, obliquely placed present 9 cms below and lateral to the supra sternal notch and is 4 cms medial to the left nipple and 2 cms lateral to mid line dimensions of the wound are 2 cms in length, 0.5 cms in width and is directed backwards and laterally entering the chest cavity.
 - a. Stab injury is noted with irregular margins.
 - b. Enters chest cavity by cutting the costo chondral junction of the left side 5th rib, of size 2 cms in length and 0.5 cms in width and cutting through and through costo chondral junction of 5th rib, 1 cms lateral to mid line.
 - c. 10 gms of red color blood clot present over anterior surface of the sternum and costo chondral junctions of both sides

Fig. 5: Deceased Boy



- d. at the level of 4th to 6th intercostals spaces.
- d. On dissection of the mediastinum about 50 gms blood clot noted over the pericardium.
- e. Stab injury, obliquely placed, present over the anterior surface of pericardium, 3.5 cms below to the origin of Ascending Aorta and noted with dimensions of 2 cms in length and 0.5 cms in width and exposing the stab injury present in the anterior surface of the left ventricle.
- f. About 200 gms of red color blood clot noted in the pericardial sac over the anterior and posterior surfaces of the Heart.
- g. Dimensions of the stab injury over the anterior surface of the left ventricle, 3.5 cms below to the origin of the ascending aorta, are 1.5 cms in length and 0.5 cms in width, left ventricular cavity deep.
- h. About 50 gms of blood clot noted in the left ventricular chamber, filled from the apex. On dissection of myocardium and heart chambers in the direction of blood flow, are pale in color with no particular smell noted. Great vessels of the heart are empty.
- i. About 1000 cc of blood with clots noted in the left side pleural cavity.

Cause of death

Haemorrhagic shock resulting from stab injury of Heart.

Discussion

Stab wounds are usually homicidal some times suicidal and rarely accidental. The present case is accidental fell down into glass piece it causes stab wound to the heart. A stab wound is produced from penetration of a pointed instrument into the depths of the body, such as knife, Dagger, nail, needle, spear, arrow, screw driver etc. that is deeper than its length and width on skin. This can occur by driving the object in to the body or form the body's pressing or falling against the object.

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Psychopathology among suicide attempters: A cross-sectional study

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Abstract

The National Crime Record Bureau reports suicide to be among the top ten causes of death & among top three in the 16-35 years age group, making suicide, clearly, a major public health concern. But still, the various paradigm of meanings underlying suicide is hardly explored by researchers, more so in the Indian scenario. This viewpoint makes this current study a needed one.

Aims

Our study aims to explore the possible underlying psychopathology, if any, among a group of suicide attempters, around the time of attempt, after stabilization of physical parameters.

Method

A total of 51 consecutive individuals who made serious suicide attempts (n=51), over a one year period were taken as the study group & their sociodemographic details collected. Each subject was then assessed for presence of any psychopathology by trained personnel using the Structured Clinical Interview (SCID) for Axis I Disorders. Frequencies of psychiatric diagnosis associated with each category of response was then tabulated.

Result

Of the 51 patients who attempted suicide, 33.33% of them could be diagnosed to have depression (unipolar more than other depression), 7.84% of sample population qualified for substance abuse or dependence & 5.8% had some form of somatoform disorder. Subjects having psychosis, anxiety disorder & impulse control disorder were relatively small (about -1.96% each). A significant 46.92% of study population was coded under Adjustment disorder, V code, or no diagnosis at the time of attempt.

Conclusion

Depression was the most common single diagnosis in suicide attempters followed by substance use & somatoform disorder, but still, 46.92% of patients did not meet criteria for any Axis-I psychiatric disorder around the time of attempt (Adjustment disorder, V code, No diagnosis). Socio cultural risk factors including stressors & negative events, may account for the reason for suicide attempt, which have not been assessed in this study. This finding is in keeping with other studies done in India, or Asian subcontinent, but not consistent with findings from Western studies which report a very high percentage of psychopathology (77-90%) among suicide attempters & completed suicides. This further makes research in this area necessary & relevant, especially in the Indian scenario.

Key words

Psychopathology, Suicide, Suicide attempters.

Introduction

Oxford's Advanced Learners Dictionary defines 'suicide', simply as an act of killing oneself intentionally. Though, this looks easy enough to comprehend, suicide, in itself encompasses an amazing paradigm of meanings which are essentially individualistic. This makes the human suicidal behaviour a source of dread & wonder at the same time. It has in it, the uniqueness of being received with totally different attitudes ranging from total empathy to detached abandonment to cruel criticism by both men of medical profession and laymen. The National Crime Records Bureau reports suicide to be among the top ten causes of death, and among the top three in the 16-35 years age group in India. The overall rate of suicide in India is around 9.9 -10.1 per 1 lakh population with attempted suicides being 10 times more common than completed ones. So the truth, that seems to stand even in the face of chaos, is that suicide is a major public health concern & a matter of primary emergency for health care professionals. Suicide is a complex outcome of multiple interrelated factors¹ which has hardly been explored by active research. Suicide is one of the leading causes of mortality in the world, with around 60% of suicides occurring in Asia alone, but is still not well understood or well researched, more so in the Indian Scenario^{2,3}. This viewpoint, thus makes this study a much needed and a relevant one. The objective of our study is to explore the possible underlying psychopathology, if any, among a group of suicide attempters around the time of attempt, after stabilization of their physical status. We hope that our findings will help add valuable data to the already existing, but scarce source in the field of suicide research.

Method

We conducted this study at the Wenlock Government Hospital, which was affiliated to Kasturba Medical College, Mangalore. This hospital provided various medical & surgical services at low costs or free of charge to a diverse population of patients, both from the city & surrounding area. Patients, presenting to casualty with an alleged history of attempt to suicide were primarily recruited as study sample. The 'suicide attempt' was established based on the report of the patient or the relative or any bystander who had accompanied the patient at the time of admission. A spectrum of behaviour ranging from suicidal gestures to serious attempts at suicide, as stated by Diekstra and Gamefski⁴, was taken as a 'suicide attempt'. Patients in the age group 18-65 yrs, and without any gross psychotic symptoms or medical comorbidity at the time of presentation only were included in the study. Patients were then interviewed, after they were deemed to be medically stable and had been shifted to appropriate wards from intensive care units or casualty service rooms at around 5-16 days after their attempt to suicide. These interviews were conducted at the bedside of the patient or in a separate isolated cubicle in the ward of the patient, maintaining as much confidentiality as possible, and only after informed consent of the patient or the bystander.

Scale used

The recruited sample, thus was assessed for any psychopathology, with the Structured Clinical Interview (SCID) for Axis I disorders for psychiatric diagnostic assessment as in DSM-IV-TR⁵. The interviewing was done by a resident, trained in psychiatry, under the supervision & guidance of a consultant holding a masters degree in Psychiatry and with experience of using SCID-I in earlier research settings. Interviews were conducted in the English language for few patients who could follow English with ease. For the rest of the study sample, questioning was done in the native language of the patient (either Kannada, Tulu or Malayalam, Konkani) with the help of an interpreter when required.

The Structured Clinical Interview for DSMIV Axis I Disorders (SCID-I) is a diagnostic exam used to determine DSM-IV Axis I disorder, that is ,major mental disorders. An Axis I SCID assessment with a psychiatric patient takes usually between 1-2hrs, depending on the complexity of the past psychiatric history & patients ability to clearly describe episodes of current & past symptoms. A SCID-I with a non-psychiatric patient takes ½ hr -1 ½ hrs. This instrument was designed to be administered by a clinician or trained mental health professional, one who has had experience performing unstructured, open ended questioning & diagnostic evaluations. There are atleast 700 published studies, both Indian & International in which the SCID was the diagnostic instrument used, examples of which are presented in the list of references⁶⁻¹². Reliability & validity of the SCID also had been reported in several published studies according to which, the range in reliability is enormous, depending on the type of sample & research methodology^{13,14}. Studies on validity suggest superior validity of the SCID over standard clinical interview at intake episode^{15,16}.

Statistical analysis

Using the data entry module Epi.Info, data derived from SCID interviews were entered in a computer, which made use of a check file for range checks & doubly entry verification. This was further analyzed by SAS package. Frequencies of reported sociodemographic variables & the clinical diagnostic profile of psychiatric disorder were tabulated. Frequencies of psychiatric diagnosis associated with each category of response were tabulated with particular attention to unipolar depression, other depression, substance use disorders, somatoform disorder, adjustment disorder, V-codes and no diagnosis also. Dual diagnosis was avoided as it would present statistical difficulties and subjects who qualified for more than one diagnosis were still given a single diagnostic category ,based on the most prominent disorder or distress causing diagnosis at the time of suicide attempt.

Results

Sociodemographic variables

The study was conducted over a one year period from august 2008 to September 2009. During this time period, 60 consecutive patient fulfilling criteria required were identified & 9 out of these, refused to participate in the study later(15%). Finally, the sample consisted of 51 patients (n=51) in the age group 18-65years, with 24 females & 27 males among them. Men & women in our study sample were of almost similar age group with a mean age of 27.3yrs. Most patients were Hindus (70.2%), followed by Christians (20.5%) & Muslims (9.3%) which was representative of the local general population at large. Only 54.2% of sample strength were educated with atleast a high school education & 45.8% of study population had not completed their primary education and this was not in keeping with the high literacy rate of the local population (70.80%). Around 47.2% of sample were single at the time of attempt, probably owing to their younger age group. The most

common method employed by suicide attempters in this sample was found to be, by consuming poisonous substances (Insecticides like organophosphorous compounds or zinc phosphide) (68.2%) or by medication overdose (usually benzodiazepines, antidepressants) (21.7%). Other causes included cutting self with a sharp weapon, hanging & jumping into well, which together constituted 10% of sample.

Diagnostic variables:

51 patient under study were thoroughly evaluated with SCID interviews and were then categorized into various DSM-IV Axis I psychiatric diagnosis as shown in Table:1. Out of the total 51patients, 17patients (33.33%) were identified to have depression (Unipolar + other depression). The combined category of patients coded under Adjustment disorder, V-code and No diagnosis, that is, patients with no other Axis I disorder, accounted for the majority of cases (46.92%). Among the rest, 7.84% of subjects qualified for substance abuse and dependence at the time of attempt & 5.88% of them qualified for a somatoform disorder. About 1.96% of sample subjects could each be diagnosed to have psychosis, anxiety disorder & impulse control disorder (Kleptomania, here) respectively.

Table 1: Diagnostic categories of patients after suicide attempt.

DSM-IV Axis I diagnosis	Total (n=51) Number	Percentage
Unipolar Major depression	13	25.49
Other depression	4	7.84
Somatoform disorder	3	5.88
Substance abuse & dependence	4	7.84
Schizophrenia & other psychotic disorder	1	1.96
Generalized anxiety disorder	1	1.96
Impulse control disorder (Kleptomania, here)	1	1.96
Adjustment disorder	12	23.52
V-Code *	6	11.7
No diagnosis	6	11.7
Total	51	100

* V-codes in DSM-IV indicate relationship problems, academic problems & additional condition that may be a focus of clinical attention

Discussion

The distribution of age, sex & religion among the study population, here, was largely representative of the local general population and no discrepancies on age was found between the sexes. This was not in keeping with the findings of a few Indian studies which reported a lesser mean age for women reporting with deliberate self harm^{11,17}, but at the same time, some studies found no much gender variations in cohorts of suicide attempters¹⁸. A large percentage (45.8%) of this study sample were less educated when compared to local general population and also a significant 47.2% of them were single at the time of attempt, probably owing to their younger age group. Both these findings may be indirect pointers towards social risk factors undermining the event of suicide attempt, as pointed out by several studies^{11,19-26}. The most common method used to commit suicide turned out to be poisoning by self, with this finding largely being consistent with similar studies in Asia and India^{3,9-12,17,21,22}, probably owing to easy accessibility to agricultural insecticides & also prescribed drugs in the market of developing countries, contrasting more violent methods of self harm, in developed countries like use of firearms.

When patients were assessed for any psychopathology at the time of suicide attempt, a significant proportion of them seemed to have diagnosable depression, which accounted for

33.33% (25.49 + 7.84%) of the total, including Unipolar & other types of depression. This was followed by 7.84% of study population identified to have substance use or dependence syndrome & 5.88% of patients qualifying for a somatoform illness. Psychosis, anxiety disorder, impulse control disorders were relatively rare (1.96% each). A significant proportion of sample i.e. 23.52% of patients could be coded under adjustment disorder, followed by 11.7% of patients could be categorised under 'V-code' & 'No diagnosis' labels each (see table 1). In other words, patients with no major diagnosable Axis-I disorders included 46.92% of the study sample (23.52% + 11.7% + 11.7%) & this percentage out numbered any single diagnostic category including depression. This finding again contrasts with findings from western societies, where, generally a psychopathology rate of 72-90% is suggested among suicide attempters & completed suicide victims^{1,2,4,19,20,24-31}. All these studies also emphasize on the early evaluation & prompt intervention of psychiatric disorders in susceptible individuals as an effective measure of prevention of suicide. However the scenario depicted in Indian studies or studies done in some developing countries^{3,11,17,21,22,32-35}, appear to be different, where in ,suicide attempters and victims, assessed, showed less of psychopathology, around 42-65%, in comparison with their western counterparts. This finding is consistent with the findings in our study. Most of the above mentioned studies in developing countries, emphasize on socio cultural risk factors for suicide, which include, social and educational disadvantage, childhood & family adversity, stressful negative life events, low self esteem, financial problems, disturbed love affair, domestic violence, separated or divorced status, relationship problems, family history of suicide or psychopathology among several others. All these suggest, improving the overall quality of life of vulnerable patients, as an important step towards prevention of suicide. The crux of the research question ,currently is, why people appearing to be psychiatrically normal commit or contemplate suicide. This is still unclear, as also pointed out by some research³⁶. The inconsistencies in findings across various research, may be due to methodological difficulties (like in psychological autopsy method), underreporting or overreporting, stigma attached to suicide and wide variations on the standard of living across the globe.

Our current study is also not without limitations. This includes the sample size being small & inadequate because of which findings cannot be generalized to a larger population. Though SCID-1 was used to assess Axis I psychopathology, Axis II pathology was not assessed, which could have significantly been present in this sample population. Risk factors & psychosocial issues were not assessed and reasons for suicide among psychiatrically normal subjects were not addressed to any extent. These limitations need to be overcome in future research undertaken in area of suicide.

Conclusion

Depression (both Unipolar & other) was the most common single diagnostic category, when assessed cross- sectionally among a group of suicide attempters. This was followed by substance use disorders & somatoform disorders, with psychosis, anxiety disorders & impulse control disorder being very rare. But still a significant proportion of patients had no diagnosable Axis I psychiatric category & had to be coded under adjustment disorder, V-code or No diagnosis. Sociocultural risk factors & negative life events at the time of suicide attempt may account for this, though they have not been assessed in this study. However, the findings of this study are in keeping with findings of similar studies in India & other developing countries, but contrast with studies from western or developed countries, which report a significantly higher level of psychopathology among suicide attempters & victims. These discrepancies among findings point towards need for more

research in this area.

As pathways of suicidal behavioural are often long & complex, research needs to focus on treatment & prevention strategies. Suicide has occurred since the beginning of recorded history with attitudes towards it varying from condemnation to tolerance depending on time & culture prevalent. Whether we condemn it or tolerate it is of little significant once the person has already committed suicide. So, research in this area,with main focus on preventive strategies are of utmost significance, if at all, we intend to make a difference in lives of people who do not intend to live.

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Study of metopism in skulls of Central India

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Abstract

Metopic suture usually obliterates by eight years, sometimes may persist as complete metopic suture or in traces. Metopism is a clinically rare condition but may be misdiagnosed as a fracture skull. Total 253 adult skulls were studied from the region of central India for the metopism. Ten skulls (3.95%) were found to be having complete metopic suture, extending from bregma to nasion without interruption. Incomplete metopic sutures were identified in 134 skulls (52.96%). Remains of sutures were seen in anterior and middle part, but not in the posterior part of suture. Five different patterns of remains of metopic sutures have been identified in this series. Sutural bones were also observed along the line of metopic suture in three skulls. The knowledge of morphological pattern of the metopic suture is important for the radiological and surgical point of view as well as for the forensic experts.

Key Words

Suture, Metopic suture, Complete suture, Incomplete suture.

Introduction

Two halves of frontal bone are separated by a frontal suture at birth. Two centres appear in eighth week in the region of future frontal eminences¹. Union of two halves begins at the level of frontal eminences and extends upwards and downwards.

As compared to the other sutures of cranium which fuse much later in life, only metopic suture fuses much earlier during childhood. Initiation of fusion of frontal suture was evident as early as 3 months of age [2]. Different authors have reported different dates of closure of metopic suture. According to Keith Sir A [3], frontal suture obliterates by the end of first year or beginning of the second year. Frontal suture obliterates by the end of second year as notified by Boileau Grant JC [4]; Romanes

GJ [5] noted fusion in fifth or sixth year; Breathnach AS [1], described in seventh or eighth years. Usual time of fusion is 2 years but it may occur anywhere from birth to 8 year of age [6].

The Metopic suture is nearly always found between the superciliary ridges. Suture may fail to disappear and persists completely separating the two halves of the frontal bone, till late life or throughout life. Such persisting suture is called as metopic suture (*Sutura frontalis persistens*), extending from bregma to nasion [5, 7]. In many primitive mammals, including lower primates suture remains patent [7]. Remnants of suture may be observed along the course of metopic suture. Wormian bones, sometimes called as *ossa interfrontalia* may be seen in the course of metopic suture and may alter sutural line.

The metopic suture shows typical dentate form. The course of posterior part of metopic suture called as *pars bregmatica* was simple and direct whereas the metopic suture in its rest of the course up to nasion was having finely serrated edges [8].

Material & Method

Total 253 adult dry skulls were selected from Medico-Legal Institute, Bhopal; People's College of Medical Sciences and Research Centre, Bhopal; and S. S. Medical College, Rewa to study the incidence and pattern of metopic suture in skulls of Central India.

Skulls were divided in three groups.

Group I-Skulls showing persistence of complete metopic suture
Group II-Skulls showing incomplete persistence of metopic suture.

Group III-Skulls showing complete obliteration of frontal suture. Cephalic Index of only group I skulls was calculated by using the formula,

Cephalic Index = Breadth of skull X 100 / Length of skull.

Group I skulls were then classified according to Cephalic Index as, Dolichocephalic with Cephalic Index below 75, Mesocephalic with Cephalic Index ranging from 75 – 80, Brachycephalic with Cephalic Index above 80.

Table no. I: Showing Cephalic Index and deviation pattern of metopic sutures in skulls. (M 1 to M10 – Skulls with Complete Metopic Suture)

Metopic Skulls	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
Deviation at Bregma in mm	2	11	3	In Line	4	4	4	5	3	In Line
Deviation at Nasion in mm	4	2	2	————	Zigzag	In Line	Zigzag	In line	In line	5
Cephalic Index	75.73	74.15	74.26	————	72.25	71.67	70.39	74.43	73.41	73.80

Fig. 1: Illustration shows complete metopic suture extending from nasion to bregma (indicated by arrows).



Fig. 2: Illustration shows deviation of posterior end of metopic suture from sagittal suture (indicated by arrows).

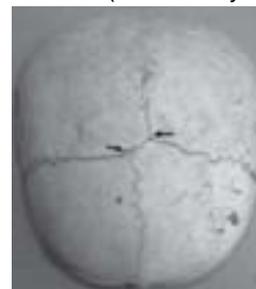


Fig. 3: Illustration shows deviation of anterior end of metopic suture from inter-nasal suture (indicated by arrows).

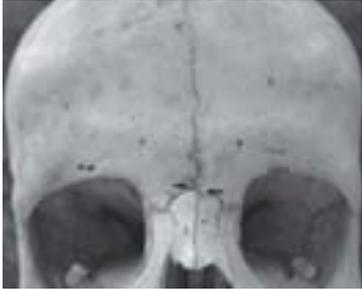


Fig. 5: Illustration shows 'liner' incomplete metopic suture (indicated by arrow).



Observations

Out of 253 skulls studied complete metopic suture (Group I) was observed in 10 (3.95%) skulls (Fig. 1) and incomplete or remains of metopic suture (Group II) were observed in 134 (52.96%) skulls. There was complete absence of frontal suture or its remnant (Group III) in about 109 (43.08%) skulls.

Cephalic Index of 10 skulls belonging to group I was calculated, out of which, 8 were dolichocephalic and one skull was mesocephalic (Table no. I). One skull with complete metopic suture was broken, so cephalic index could not be calculated.

In 8 out of 10 skulls posterior end of the metopic suture and anterior end of sagittal suture was found to be deviated from each other at bregma by 2mm to 11mm as shown in table I (Fig. 2). In two skulls sagittal and metopic sutures were in line. Deviation was also observed in 4 skulls between the anterior end of metopic suture and inter-nasal suture at nasion by 2mm to 5mm as shown in table I (Fig. 3). Anterior end of the metopic suture is in line with the inter-nasal suture in three skulls. In two skulls meeting point of two sutures could not be defined because due to complexity of incomplete metopic suture at nasion.

Of 134 skulls with incomplete metopic suture, 132 skulls showed persistence of remnants of metopic suture in anterior part only, while 2 skulls showed persistence of remnant in anterior as well as middle part also (Fig. 4). But none of the skulls showed persistence of remnant in posterior part of suture.

Highly complex and variable five patterns were observed out of 132 skulls with incomplete metopic suture.

1. Linear – 82 (Two with sutural bone) (Fig. 5)
2. Wide side to side excursion shaped – 47 (Fig. 6)
3. 'U' Shaped – 2 (Fig. 7)
4. Double Zigzag – 2 (Fig. 8)
5. 'T' Shaped – 1 (Fig. 9)

Sutural bones were observed in total 3 skulls, 2 skulls with metopic remnants and one skull with complete metopic suture (Fig. 10).

Discussion

Ossification centres for the frontal bone appear at a point above the orbital margin and below the frontal eminence. Two

Fig. 4: Illustration shows remnants in anterior and middle parts of metopic Suture (indicated by arrows).



frontal ossifications fuse at about the end of the 1st year or early in the second. The complete suture persists in 3 to 8 % of individuals according to race [1, 3, 5, 9]. Metopic suture may be complete or may found in traces. Complete metopic suture was observed in 10 skulls out of 253 skulls i. e. 3.95%. Incomplete metopic suture was observed in 134 (52.96%) skulls. Parsons FG [10], reported complete metopic suture in 52 out of 590 specimens (9% approx.), in the Hythe series of skulls.

Jit and Shah [11] noted complete metopic suture in 5% of Punjabi Skulls. Agarwal et al [12] reported the incidence of metopism in 2.66% cases of Indian crania. Jit & Banga [13] studied metopism in 475 cadavers of north-west population of India, and noted complete metopic suture 5.5% in males, 4.4% in females.

Del Sol et al [14] studied 400 dry skulls of adult Brazilian population and reported metopism in 11 skulls (2.75%). Incomplete metopic suture was present in 115 skulls (28.75%). Ajmani et al [15] studied 206 adult Nigerian skulls for the incidence of the metopic suture. Metopism was present in 3.4% of cases, whereas incomplete metopic suture was observed in 65 cases (31.57%). Baaten et al [16] demonstrated complete metopism in 0.82 % and incomplete in 0.93%, with an overall incidence of 1.75% from the 968 studied radiographically in Lebanese population. Castilho et al [17] reported metopism in 7.04% (5/71) and incomplete metopic suture in 32.39 % (23/71) out of 71 dry skulls of adult Brazilian subjects.

Many theories have been put forth relating to the persistence of metopic suture. Persistence of suture was related to the expansion of the frontal lobes and regarded as an index of intellectual status. However no correlation was seen between cranial capacity and persistence of metopic suture. Bolk L [18] tried to correlate the persistence of suture to the extent of the attachment of the temporal muscles to the frontal bone. However closure of suture depends on intrinsic growth factors.

Persistent lower remains are highly complex and show variability in their patterns. Five such patterns have been observed. Jit & Shah [11] described 3 types of sutures near nasion, 'V' type, 'Y' type & 'H' type. Castilho et al [17] described 3 patterns including linear, 'V' shaped and double incomplete metopic suture. Agarwal et al [12] described a peculiar inverted 'Y' shaped and radiating type incomplete metopic suture. In

Fig. 6: Illustration shows wide side to side excursion shaped incomplete metopic suture.



Fig. 7: Illustration shows 'U' shaped incomplete metopic suture.



present study 'U' shaped incomplete suture has been described, which was also shown by Del Sol et al [14], Ajmani et al [15]. A unique 'T' shaped suture was seen in present study which was not reported earlier.

It was a common belief that metopism occurs more frequently in brachycephalic than in dolichocephalic races. Our study does not support this idea as 8 out of 10 skulls with complete suture were dolichocephalic and none of the skulls was brachycephalic. Castilho et al [17] observed complete metopic sutures had the same incidence in mesocephalics, 40% (2/5) & dolichocephalics, 40% (2/5). Bryce TH [19] also stated that there is no correlation between brachycephaly and persistence of complete metopic suture.

Not always the sagittal and metopic sutures are in aligned one line. Sometimes posterior end of the metopic suture does not meet in midline with sagittal suture and instead meets coronal suture at bregma. In this study the sagittal and metopic sutures were deviated from each other by 2 mm to 11 mm in eight skulls. Similarly anterior end of the suture fail to meet the inter-nasal suture in four skulls. These sutures were found deviated from each other by 2mm to 4mm. Our findings were similar to Agarwal et al [12], who observed that the sagittal and inter-nasal sutures do not meet in the midline. Wood Jones F [8], also observed the deviation of 15 mm.

Pars bregmatica in our study was found to be finely serrated and not as simple and direct as described by Wood Jones F [8]. Sutural bones sometimes found interposed in the metopic suture. We have observed sutural bones in three skulls, in which one skull with complete suture and two in incomplete metopic suture. Sutural bones may alter the line of suture [5], which was observed in these cases also. Interparietal bones were not seen in any of the skulls with metopism.

Incomplete metopic sutures may go unnoticed on X-rays. Open metopic suture and fracture skull can be clearly differentiated in traumatised patients by using 3D CT and Multiplanar Reformat (MPR) scan than X-ray [20].

Metopic sutures sometimes may be wrongly diagnosed as vertical fractures on X-ray studies [16]. Bademci et al [20] stressed that, the surgeon should be aware of this anatomical condition during surgical intervention and in traumatized patients as this may mimic fracture skull during emergency.

The knowledge of morphological pattern of complete or incomplete metopic suture is important for forensic experts as

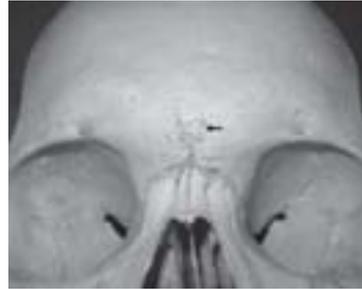
Fig. 8: Illustration shows zigzag double line pattern of incomplete metopic suture.



Fig. 9: Illustration shows 'T' shaped incomplete metopic suture.



Fig. 10: Illustration shows presence of wormian bone along the line of metopic suture (indicated by arrow).



this condition may be mistaken for linear fracture of skull in cases of head injury.

Conclusion

Although the studies have mentioned about the persistence of the suture, clinically this condition is rare. Therefore, condition may mislead as fracture skull by surgeons, radiologists or by forensic experts. Thus this condition should always be kept in mind in case of suspected fracture skull.

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Hair patterns of the scalp, face and neck in north Indian males

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Abstract

Hair patterns of the scalp, face and neck have been studied in a random sample of 135 healthy, North Indian males, ranging from 18 to 45 years of age. The results show that totopilose (59.25%) scalps, minimo-pilose (63.7%) faces, anterior cervical apilosity (74.07%) and transcervical (48.14%) distribution of the posterior cervical hair are commonest. Apilosity of the anterior cervical region is chiefly correlated with circumareolo-sternal (37.78%) type of the chest hair. Occurrence of most of the hair patterns in a wide age range emphasizes the value of this type of study in classifying the human groups and working out the secular trends of a population.

Keywords

Totopilose, Minimo-pilose, Apilosity, Transcervical, circumareolo-sternal.

Introduction

There are as yet few studies of hair patterns of the scalp, face and neck in Central Indian males, however in North Indian males the data is scanty. The study of hair patterns was described as trichoglyphics¹. Hamilton² (1951) described in whites 8 types of scalp hairiness, including nonbald scalps in types 1 through 3, and bald scalps in types 4 through 8. Trotter³ (1922) pointed out that the upper lip is the region of the face which shows the most constant tendency for vigorous hair growth in both sexes. Thomas and Ferriman⁴ (1957) sketched the degrees of hair growth on the upper lip and chin of women. Hamilton et. al⁵ (1958) reported that the configuration of the bearded area is essentially the same in identical male twins but not so in unrelated subjects of the same age. Setty evolved the nomenclatures and presented incidence of hair patterns of various parts of the body in the white and Negro males, including those of the scalp⁶ (1970), face⁷ (1971), anterior cervical region⁸ (1966) and posterior cervical region⁹ (1972).

Basic types of hair pattern in literature.

A) In Scalp: Three basic hair patterns of the scalp have been described and these are totopilose, indentato-pilose, and indentato-circulopilose.

B) On Face: Four basic hair patterns of the face have been described and these are as under

1. Maximo-pilose. Hair on superior labial, inferior labial, mental submental, upper cervical and cheek regions.
2. Fenestro-pilose. Same as maximopilose except for bare area circumscribed by hair on inferior labial region. This bare area is located one fourth to one inch vertically and one-half inch to one and one-half-inches horizontally.
3. Indentato-pilose. Same as maximo-pilose except for indentation in upper margin of inferior labial region. Indentation one half inch to one and one half inches vertically and three fourths inch to two inches horizontally. Indentation of right side and that of left continuous or not continuous with one another in middle by bare strip three-fourths inch to one inch vertically.

4. Minimo-pilose. Hair on superior labial region. Hair on inferior labial region limited to midline or absent. Bare area of inferior labial region continuous laterally with bare area of cheek and continuous or not continuous across midline with bare area of inferior labial region of opposite side.

C) On Chest: The basic hair patterns of the chest of white males have been named on the basis of the areas of the chest on which the coarse hairs occur^{10,11}. They are total 15 in number and comprise three series and these series are

- i) Pecto-sterno-infraclavicular series are: 1) sternal 2) infraclavicular 3) sterno-infra-clavicular 4) pectoral, pecto-sternal 5) pecto-infraclavicular 6) pecto-sterno-infraclavicular.
- ii) Circumareolar series are: 1) circum-areolar, 2) circumareolo-sternal, 3) circumareolo-infraclavicular 4) Circumareolosterno-infraclavicular.
- iii) Circumareolopectoral series are: 1) circumareolo-pectoral 2) cicumareolo-pecto-sternal 3) cicumareolo-pecto-infraclavicular 4) cicumareolo-pecto-sterno-infraclavicular. The present paper describes hair patterns of the scalp, face and neck in a random sample of healthy males of North India. Apart from their correlation with one another, the anterior cervical hair patterns are correlated with the chest hair.

Material and methods

The study was done on a random sample of 135 healthy and sexually mature Hindu males of Sri Guru Ram Das Institute of Medical Sciences and Research, Sri Amritsar. The majority (85%) of the subjects were medical students of MBBS and BDS Classes between 18 to 25 years of the age. The rest (15%) included male Hindu teachers and other male Hindu employees of the college whose age ranged from 25 to 45 years. All of them were normal and healthy and did not demonstrate any endocrine disturbance.

None of the subjects was permitted to shave for three days proceeding the time of start to study of the face. Each subject was stripped above his waist and examined in a well lighted room having both natural and artificial light. Hair patterns of the scalp, face, anterior and posterior cervical regions were noted. For sake of comparison, the chest hair patterns were also noted. The nomenclatures were followed from the studies done by Setty in various studies⁶⁻¹¹.

Observations

The incidence of hair patterns of the scalp, face, anterior and posterior cervical regions is shown in Table I. The totopilose (59.25%) pattern of the scalp is commonest in the age group of 18 to 25 years; the indentato-pilose (40.75%) was the second commonest variety which occurs in a higher age group of 18 to 45 years. The facial hair distribution was in forms of minimo-pilose (63.70%), indentato-pilose (20.74%), fenestro-pilose (8.14%) and maximo-pilose (7.40%) in this order of decreasing frequency.

The anterior cervical hair is lacking in the majority (75%) of subjects and apilosity is a little over three times more common than pilosity. However, the hair patterns observed in

Table I: Incidence of Hair Patterns of the Scalp, Face and Neck in North Indian Males.

Hair pattern	Age range in years	Number of cases	Percentage
Scalp			
1.Totopilose	18-25	80	59.25
2.Indentato-pilose	18-45	55	40.75
3.Indentato-circulo-pilose	-	-	-
Face			
1.Maximo-pilose	19-45	10	7.40
2.Fenestro-pilose	18-45	11	8.14
3.Indentato-pilose	18-45	28	20.74
4.Minimo-pilose	18-40	86	63.70
Anterior Cervical			
1.Supraclavicular	18-22	7	5.18
2.Suprasternal	19-45	19	14.07
3.Supraclaviculo-supra-sternal	19-21	9	6.67
4.Apilose	18-45	100	74.07
Posterior cervical			
1.Transcervical	18-45	65	48.14
2.Latero-medial	18-40	29	21.48
3.Lateral	18-45	41	30.37

Table II: Correlation of the Scalp, Facial and Posterior Cervical Hair in North Indian Males.

Hair pattern	Totopilose	Indentato-pilose	Indentato circulo-pilose	Total	%age
Facial Hair					
1.Maximo-pilose	2	7	-	9	6.67
2.Fenestro-pilose	3	6	-	9	6.67
3.Indentato-pilose	9	19	-	28	20.74
4.Minimo-pilose	67	22	-	89	65.92
Total	81	54	-	135	100
Posterior cervical					
1.Transcervical	51	26	-	77	57.0
2.Latero-medial	15	13	-	28	20.74
3.Lateral	15	15	-	30	22.22
Total	81	54	-	135	100

Table III: Correlation Of The Anterior Cervical Hair With The Chest Hair In North Indian Males.

Chest hair	Supra-clavicular	Supra-sternal	Supraclaviculo-suprasternal	Apilose	Total	%age
1.Sternal	-	-	-	4	4	2.96
2.Infraclavicular	-	-	-	-	-	-
3.Pectoral	-	-	-	-	-	-
4.Pecto-sternal	5	-	-	12	17	12.59
5.Pecto-infraclavicular	-	-	-	-	-	-
6.Pecto-sterno-infraclavicular	2	14	7	12	35	25.92
7.Circumareolar	-	-	-	11	11	8.14
8.Circumareolo-sternal	-	2	-	49	51	37.78
9.Circumareolo-infraclavicular	-	-	2	-	2	1.48
10.Circumareolo-sterno.	-	2	-	3	5	3.7
Infraclavicular	-	-	-	-	-	-
11.Apilose	-	-	-	10	10	7.40

this part of the body are mostly suprasternal (14.07) and partly supraclaviculo-suprasternal (6.67%) and supraclavicular (5.18%). The transcervical (48.14%) pattern of posterior cervical hair is over twice as common as the lateral (30.37%) and latero medial (21.48%) varieties.

Table II shows correlation between the hair patterns of the scalp and those of the face and posterior cervical region. The totopilose distribution of the scalp hair i.e. nonbald scalp is mostly accompanied by minimo-pilose variety of the facial hair and transcervical variety of the posterior cervical hair. The next commonest correlation is between the indentato-pilose scalp, minimopilose face and transcervical pilosity fo the back of neck. The indentato-pilose scalp are also correlated significantly with the indentato-pilose faces.

Correlation of the anterior cervical hair and the chest hair is shown in Table III. The highest incidence is combination of apilosity of the anterior cervical region and circumareolo-sternal

distribution of the chest hair. The next frequent correlation is between the pecto-sterno-infraclavicular chest hair and suprasternal or pilose patterns of the anterior neck.

Discussion

A totopilose scalp is a feature of the young age as evidenced by its predominance in 18 to 25 year age. With advancing age, the baldness begins as an indentato pilose pattern and proceeds to the indentato-circulo-pilose form which initially is confluent and later becomes nonconfluent. Setty⁶ (1970) observed the advanced type of baldness above the age of 40 years. The facial hair (beard) makes its appearance as a minimopilose pattern which may progress into the other forms. Distribution of almost each type of this hair in all age groups studies shows that any one type may persist to become the final pattern of a particular individual.

The majority of the subjects (75%) of a wide age range show absence of hair in the anterior cervical region. In the remaining one third of them, the various hair patterns are distributed in different proportions with a predominance of the suprasternal type which is also distributed evenly throughout the age range investigated. A little over half of the cases have a trans-cervical pattern of the posterior cervical hair. The lateral and latero-medial types occur roughly in equal proportions in the rest half of the cases. The wide age range of occurrence of most of the hair patterns under consideration, except for those of scalp and the supraclavicular type of the anterior cervical hair, emphasizes the importance of this type of study in classifying human groups, and working out the secular trends of a population.

The present data is not comparable with studies done by Setty⁶⁻⁸ because of the difference in the age group, which was upto the age of 99 years in Whites and Negroes. According to him, the indentato-pilose scalps predominate in both Whites (81.2%) and Negroes (68.9%); the maximo-pilose faces are common (54%) in Whites, whereas in Negroes the fenestro-pilose pattern is a little more common (35.3%) than either the maximo-pilose (27.7%) or the indentato-pilose (25.7%) patterns. The supraclavicular (21.8%) and supraclavicular – suprasternal (23.7%) patterns form the chief types of the anterior cervical hair and both together equal to the frequency of apilosity (45.6%) of this region in the White males, whereas in Negroes the anterior cervical apilosity (85%) was by far the commonest. The posterior cervical hair is arranged in the lateral (39%) and latero-medial (37.8%) patterns making a total of 76.9% percent frequency in the Whites but in Negroes the lateral pattern alone occurs in 59% males.

Summary

The various observations made in present study are as

1. A totopilose scalp is a feature of the young age as evidenced by its predominance in 18 to 25 years age.
2. The facial hair (beard) makes its appearance as a minimo-pilose pattern which may progress into the other forms. The totopilose distribution of the scalp hair, i.e. nonbald scalp, is mostly accompanied by minimo-pilose variety of the facial hair and trans-cervical variety of the posterior cervical hair.
3. Regarding correlation of the anterior cervical hair and the chest hair the highest incidence is displayed by a combination of apilosity of the anterior cervical region and circumereolo-sternal distribution of the chest hair.
4. The majority of the subjects (75%) in present study show absence of hair in the anterior cervical region. Half of the cases have a trans-cervical pattern of the posterior cervical hair.
5. All of the hair patterns show a wide age range. The wide age range of occurrence of most of the hair patterns under consideration, except for those of scalp and the supraclavicular type of the anterior cervical hair emphasizes the importance of this type of study in classifying human groups and working out the secular trends of a population.

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Victim profile in homicides

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Abstract

Killing of an individual is the highest level of aggression found in all cultures. Incidence of Homicide is on the rise worldwide mainly due to effects of population explosion, changing life style, aggressive nature and insatiable desire of human being to conquer the world. This prospective study from Oct 2005 to Sep 2007 was done in the Dept of Forensic Medicine, MS Ramaiah Medical College, Bangalore, revealed that homicidal deaths accounted for 4.32% of autopsies, victims in the age group 20-39 years constituted 61.6% and males 71.75% of cases. 80.75% were Hindus, 56.25% were married. Majority of them belonged to middle (49.25%) and lower (38.5%) socioeconomic status, 22.75% of them hailed from outside the city, about quarter of victims (26.25%) had consumed alcohol at the time of crime and homicide by means of injuries was the commonest method involved (75.5%).

Key words

Victim, Profile, Homicide, Homicide – Suicide,

Introduction

Human being is the most intelligent animal on earth. The aggressive nature, creative ability and insatiable desire to conquer the environment expose them to severe trauma and violent deaths. One of the components of violent death worldwide is homicidal death. Homicide is defined as killing of one human being by another human being and is one of the leading causes of unnatural deaths¹.

Homicide is the most serious crime as old as civilization and reported as early as in the Bible². Historically there are innumerable instances of murder plots and revenge murders – in Mythology Krishna straddled and killed Kamsa, Bhima struck with mace to kill Duryodhana, Socrates was poisoned with Hemlock etc. In 13th Century pardonable homicide was distinguished from homicide committed with preplanning³. Homicide – Suicide: Describes a situation in which a homicide has been followed by the suicide of the perpetrator³. The incidence of homicide is increasing world wide because of effects of population explosion, changing life style, modern needs of the man and easy availability of weapons, family relationships, marital disputes, cultural, psychological, social influences, religious attitudes, criminal activities, political factors, unemployment and low socio economics status. Alcohol abuse, stimulants and hard drug is the recipe for the large proportion of violent crimes including the homicides.

Homicide is widely accepted as the public health problem which can be understood to reflect the contemporary societies concern with the heightened incidence of deliberate physical violence seen in all industrialized countries over the last decades. About 5,20,000 people die every year world wide as a result of interpersonal violence and about 95% of homicidal deaths occur in low and middle income countries. The highest inter personal violence mortality rates world wide were found in the Americans, among males aged between 15-29 years. About 900 people die every day in south East Asia region from violence and homicide constitute a significant proportion of such violent deaths⁴. About 80-100 homicides take place every

day in India⁵. About 632 murders took place in the Bangalore city in 3 years (January 2003 to December 2005)⁶. The Land and Cable mafia are ruling the roost and are contributing to the rising incidence of murders in the metros and other factors being rapid growth, soaring land prices, the huge influx of people from all walks of life into the cities etc. Homicides could be for monetary gain, due to domestic and family feuds, following petty arguments, serial killings and gang wars.

In homicides the profiling of the victims gives an insight as to the reasons which make them susceptible for being victimized. In view of the increasing incidence of such deaths and its impact on the society, the present study was undertaken so as to ascertain the most vulnerable age group, sex incidence, religion, nativity, marital status, socio-economic status, past history, alcohol consumption by the victim at the time of crime and method of homicide.

Material and methods

This prospective study was conducted in the department of Forensic Medicine M.S.Ramaiah Medical College Bangalore during the period from Oct 2005 to September 2007, a period of 2 years. All the cases brought to the dept for medico legal autopsy which were registered as homicide were included in the study. Clearance from the Ethical committee was obtained. Detailed information regarding the circumstances of crime was sought from the police, victim's relatives and friends, visits to the scene of occurrence or photographs of the scene of occurrence. Post mortem examination of the case was carried out as per the standards⁷. Socio Economic status of the victim was based on modified Kuppaswami's classification (2005 revision)* (Annexure I) depending on their education, occupation and income. Descriptive statistics for qualitative type of data was summarized using frequency and percentage.

Results and discussion

During the study period, from October 2005 to September 2007, 1319 medico-legal autopsies were conducted, of which homicidal deaths constituted 57 cases (4.32%).

Table 1: Distribution of victims based on age and sex

Sl No	Age group (in years)	No. of cases		Total	%
		Male	Female		
1	0-19	5	5	10	17.5
2	20-39	26	9	35	61.6
3	40-59	8	1	9	15.8
4	60 and above	2	1	3	5.2
	Total	41	16	57	100

The highest incidence in 20-39 years age group is very much expected as males in this age group are aggressive in nature and are into criminal activities due to unemployment, financial instability exposing them to violent trauma leading up to gang wars, real estate rivalry and other reasons being unsuccessful romantic disputes, for momentary gain/property gain, argument under the influence of alcohol etc. In females

it's due to domestic reason like marital dispute, arguments, infidelity and dowry harassment. Victimization in the age group 0-19 years -most of which was constituted by the kids who were targeted for none of their mistakes as they were either part of homicide - suicide events due to socioeconomic stress of their parents or done to death due to revenge on their parents. Similar findings were observed in the studies conducted by the Virendra Kumar⁸, Scott K.W.M⁹, and Mohanty M.K.'s¹⁰. It is in contrast to the findings observed by Saint Martin P¹¹ where most of the victims belonged to 50-59 years.

Males constituted 71.75% of victims as in India they are generally working outdoor and are of aggressive in nature since those who are most likely to be on the receiving end of the aggression, males are at greater risk of being victimized. Females remain in door and are of soft natured and hence susceptible to domestic homicides. Similar observation made by Alan Fox¹², Rygol K¹³, Henderson J.P.¹⁴ and Mohanty M.K.¹⁰,¹⁵ where as in a study by Kominato Y.¹⁶ male to female ratio of the victims were 1:1.

Table 2: Distribution of victim based on their religion

Sl No	Religion	No. of cases	Percentage
1	Hindu	46	80.75
2	Muslim	7	12.25
3	Christian	2	3.5
4	Not known	2	3.5
	Total	57	100

Maximum number of victims belong to Hindu religion is obviously because Hindus constitute the major population of India. In 2 cases the religion of the victim could not be identified as in one case the body was charred beyond recognition and the other being an unknown kid of 1year old posing difficulty in coming to conclusion as to the religion.

Table 3: Distribution of victim according to their native

Sl No	Native	No. of cases	Percentage
1	Bangalore	38	66.75
2	Immigrant	13	22.75
3	Not known	6	10.5
	Total	57	100

Two third of (66.75%) victim were from Bangalore as the local population is obviously more than immigrants and which could also be attributable to the local people getting involved in Real Estate rivalry, Cable mafia and gang wars etc exposing them for the greater risk and which is also because immigrants depriving the facilities/employment opportunities of the local people. The reasons among the immigrants were lack of local/family support, domestic feuds, pretty arguments, infidelity and socioeconomic constraints etc.

Table 4: Distribution of victim according to the marital status

Sl No	Marital Status	No. of cases	Percentage
1	Married	32	56.25
2	Unmarried	19	33.25
3	Divorced	1	1.75
4	Not known	5	8.75
	Total	57	100

In married males arguments, property gain, financial gain were the main reason where as in married females dowry harassment, infidelity, marital disharmony and argument were the main reason. In the unmarried male unemployment family forcing them to involve in criminal activities like rivalry, supari killing was the main reason. Similar observation was made by Virendra Kumar⁸ where in the majority of the victims were married (47%) and in the observation made by Wahlsten P¹⁷ 46% victims were married, co- habitant or otherwise involved in long relationship.

Table 5: Distribution of victims according to their Socio economic status

Sl No	Class	No. of cases	Total	Percentage
1	Upper I	1	1	1.75
2	Middle II	6	28	49.25
		12		
3	Lower IV	22	22	38.50
		0		
4	Not known V	6	6	10.50
	Total		57	100

Most of the victims belonged to the middle socio economic status(47.25%) and lower socio economic status(38.50%) as ours is a developing country and much of the people fall in these groups and the reasons among middle socio economic status group were for momentary/property gain, gang rivalry, real estate enmity and cable mafia etc. Among the victim belonging to the lower socioeconomic status because of unemployment, lack of education and financial problems/ conflicts either forcing them to take up criminal activity hence thereby becoming susceptible for victimization or they were involved in homicide - suicide events, dowry harassments and hence most of them involved in domestic homicides. Similar observation was made by Virendra

Table 6: Distribution of victim based on their past history

Sl No	Past History	No. of Cases	Percentage
1	Religious attitude	0	0
2	Criminal activity	6	10.50
3	Family relationship problem	9	15.75
4	Drug and alcohol abuse	16	28.00
5	No significant history	19	33.25
6	No history found	6	10.50
	Total	57	100

Kumar⁸ where most of the victims came from semiskilled-unskilled group (71.9%).

The study exemplifies that people are tolerant to other religion or castes as there were no cases due to religious attitudes. In about 33.25% of cases there was no significant past history as they were committed at the spur of moment, were not premeditated and most of the victims constituted innocent children who were part of

Table 7: Distribution of victim based on presence of alcohol/ consumption of alcohol

Alcohol Consumption by victim	No. of cases	Percentage
Present	15	26.25
Absent	42	73.75
Total	57	100

homicide-suicide events, the next major reason being alcohol and drug abuse, followed by family relationship problems and criminal activities.

Among those who had consumed alcohol at the time of attack, most of them picked a petty argument which led to their death. [Alcohol consumption at the time crime was based on history, smell at autopsy and confirmed by FSL reports]. In few cases the victim were made to consume alcohol by their acquaintance and then done to death by them as they were

Table 8: Distribution of victims based on methods of homicide

Sl No	Method of homicide	No. of cases	Percentage
1	Injuries	43	75.5
2	Asphyxiation	13	22.75
3	Poisoning	0	0
4	Not known	1	1.75
	Total	57	100

premeditated. This is similar to observations made by Wahlsten.¹⁷

Most of the deaths due to injuries were because of gang rivalry, real estate enmity and cable mafia etc and most of those due to asphyxiation were domestic homicides the reasons being the socioeconomic constraints, infidelity, dowry harassment and few were part of homicide-suicide events and most of them were unpremeditated. This study is similar to the studies conducted by P. Wahlsten¹⁷, Gupta Avnesh², and Mohanty M.K.¹⁰ and is in contrast to the studies by Preti A¹⁸, Alan Fox¹¹; where in Firearms were the most common means used for homicides as gun licensing is liberal in western countries as compared to India.

Conclusion

- Homicidal deaths accounted for 4.32% of total autopsies conducted.
- Majority of the victims (61.6%) belonged to the 20-39 years age group and males constituted 71.75%.
- 80.75% of them were Hindus.
- 22.75% of victims hailed from outside the city.
- More than half (56.25%) of the victims were married.
- Most of them were from middle (49.25%) and lower (38.5%) socioeconomic status.
- 26.25% of victims had consumed alcohol at the time of crime.
- Homicide by means of injuries was the commonest method (75.5%) involved.

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Annexure - I

Modified Kuppaswami's classification of socio economic status (2005 revision):

Urban areas

Three characteristics viz Education, Occupation and Family Income

Weighted score of the each of the three characteristics

Based on total score the victim is assigned to appropriate social class

$$\text{Correction factor} = 371 \times 4.93 / 100 = 18.29 \sim 18$$

Education	Score
Professional or honors	7
Graduate or post graduate	6
Intermediate or post high school diploma	5
High school certificate	4
Middle school certificate	3
Primary school certificate or literate	2
Illiterate	1
Occupation	Score
Profession	10
Semi Profession	6
Clerical, Shop owner, Former	5
Skilled worker	4
Semi Skilled worker	3
Un Skilled worker	2
Unemployed	1

Income	Revised	Score
Family Income per Month >2000	>17520	12

1000 – 1999	8760 – 17515	10
750 – 999	6570 – 8750	6
500 – 749	4380 – 6560	4
300 – 499	2628 – 4370	3
101 – 299	885 – 2620	2
< 100	<876	1

Total Score		Socio Economic Class
26-29	Upper	Upper (I)
16-25	Middle	Upper Middle(II)
11-15		Lower Middle (III)
5-10	Lower	Upper Lower (IV)
<5		Lower (V)

A study on pattern of injuries in railway deaths

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Abstract

This study was carried out on 97 railway related deaths in order to determine the specific pattern and distribution of wounds. Of the 97 victims, 90 (92.7%) were males and 07 (7.3%) were females. The majority were in the age group of 21-30 years. Most of the victims died as the result of an accident 67 (69%) and 30 (31%) suicide cases reported. 9 victims (9.2%) showed elevated blood alcohol levels on chemical analysis. In 97 railway deaths, 80 (82.4%) victims were Hindu by religion and 17 (17.5%) Muslims. Out of 97 deaths 79 (81.44%) victims were married and 18 (18.5%) victims unmarried. Decapitation and hemi section of the body at the level of thorax were more common in suicidal deaths. Head injury accounted more in accidental deaths.

Key words

Railway, Suicide, Accident, Injuries.

Introduction

In India, railway related deaths are quite common. India has one of the largest railway networks in the world and accidents are not unexpected. In a few cases a determined suicide victim will deliberately lie across the railway track or even place his/her head so that self-destruction is inevitable⁽¹⁾. In the absence of a case history, it is difficult to distinguish between death due to crossing a track, suicide, or criminal violence.⁽²⁾ Death associated with railways mostly occurs when a person attempts to cross the track or uses the track as a convenient route for walking. Other reasons for death may be a train and automobile accident, a collision between trains, or passengers hanging out of compartment doors who are hit by posts, trees or electrical poles and outbreak of fire in a running train⁽³⁾. Trauma related to railway accident victims is usually severe, instantly fatal and extremely mutilating. Certain features such as wheel marks on the body, dirt and grease contamination and the manner of severance of tissues deserve special observation to rule out criminal violence⁽⁴⁾. The present study has been carried out to establish the incidence, pattern and manner in cases of railway related death.

Materials and methods

All the victims who succumb to railway deaths were subjected to post mortem examination in the mortuary Govt general hospital, Gulbarga. In 2732 autopsies performed during a five-year period from January 2005 to December 2009, 97 cases (3.55%) were related to railway deaths. Each death was evaluated and information regarding the age and sex of the victim, pattern of injuries and manner of death was collected from the police records, post mortem reports and case diaries. All data was collected analysed and findings were tabulated.

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Cases where a train was not involved in the causing death, victims found dead in the railway premises due to natural cause without any external injuries over the body and bodies brought by railway police in advanced stage of putrefaction were excluded from the study.

Results

During the five-year period from Jan 2005- Dec 2009, among 2732 post-mortem cases which came to the mortuary included 97 victims of railway related death.

The overwhelming majority of victims were male 92(92.7%) and 07(7.3%) were female, giving a male to female ratio of 13:1. Most of them were in the age group 21-30 years (Figure 1). The ages of the victims ranged from 13 to 76 years. Most of the deaths 67 (69%) were accidental in nature. 25 out of 30 suicide cases showed decapitation (83.3%) and 5 cases showed hemi section of the body at the level of thorax (16.7%) . 9 victims (9.2%) showed elevated blood alcohol levels on chemical analysis and all victims were found to be males. In 67 cases (69%) of accidental deaths which involved multiple injuries splitting the body into several pieces that are soiled by axle grease and dirt from the wheels and tracks (see photograph). Among 97 victims 79(81.4%) were married and 18(18.5%) unmarried. Total number of Hindu victims included 80(82.4%) and Muslims 17(17.5%).

Discussion

Deaths have occurred in association with railways since the inception of the railway industry.⁽⁵⁾ Trains are one of the important modes of transport in our country and have become part of the day-today life of the people.

In the present study, males are the commonest victims of railway related death which is in accordance with the study conducted by other authors.^(2,4,5,6,7,8) Males being the working group prefer railways as the cheap, quick and comfortable mode of transport for travelling from one place to another and are therefore more vulnerable than females.

(Table No 1 and Figure No 1).

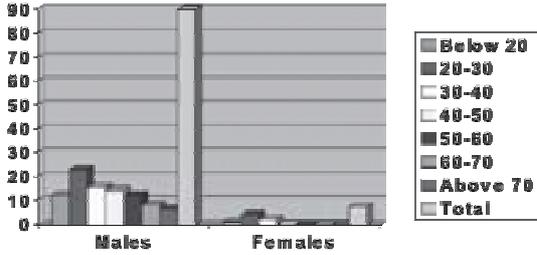
In our study, the age group most commonly associated with railway related death was between 21-30 years and significantly less in the extreme ages. This age group is more vulnerable, as it is the age for marriage and settlement. In this modern era where there is struggle in each and every step of life and increased stress for early settlement, little failures combined with other factors compel the victim to take decision for ending his life. This corresponds with other studies undertaken.^(2, 6, 9)

(Table 1 and Fig. 1).

Table 1:

Age in years	Males	Females
Below 20	12	01
20-30	23	04
30-40	15	02
40-50	14	00
50-60	12	00
60-70	08	00
Above 70	06	00
Total	90	07

Fig. 1:

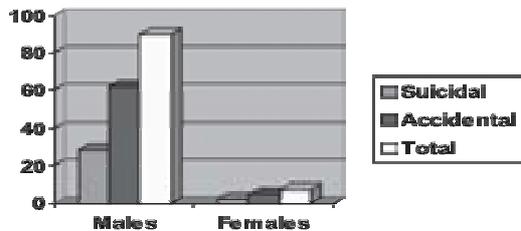


The conclusions regarding the manner of death are based upon the history given by the police, the crime scene investigation and autopsy findings. Accidental deaths outnumbered suicides (Table 2 and Fig. 2). Our findings were similar to the study conducted in Cape Town, South Africa ⁽²⁾, in Jefferson County,

Table 2:

Manner of death	Males	Females
Suicidal	28	02
Accidental	62	05
Total	90	07

Fig. 2:



Alabama ⁽⁵⁾, and in Charleston ⁽⁶⁾. In spite of various measures taken by the railway department to reduce the railway related deaths like displaying signboards, construction of overhead pathways, manned crossing levels, advertisement in electronic media, frequent announcement of upcoming trains at railway stations most of the victims fail to comply with. Victims when under the influence of alcohol lack self control and capacity to judge, are either unaware of the upcoming train or unable to judge on which track train is moving sustain fatal trauma ⁽¹¹⁾. Many suffer fatal injuries trying to board or while alighting from a moving train resulting in heart rendering scenes. The present study also demonstrates people showing disregard for their personal safety.

While some are caught accidentally, many of the victims with a strong intent and firm mind to end their life lie down on the railway track committing suicide. Suicidal deaths due to train run over are common in males as they prefer one of the hard methods of committing suicide than females thus exhibiting a greater degree of auto aggressive and self destructive behaviour. Suicidal injuries are extensive due to primary impact. If the person lie down on the railway tracks there may be decapitation, extrusion of organs, amputation of trunk.⁽¹¹⁾ Amongst 30 suicide cases, 25 had a decapitation and remaining had hemi section of the body at the level of thorax with or without other injuries.

In the railway accidents, most of the victims had fatal injuries over the head which correlates with the findings of other authors. ^(2,8,10) In many cases, fatal injuries mutilated the body and involved more than one body region which is in accordance with Cina et al ⁽⁶⁾ who conducted retrospective analysis of 25 consecutive train/pedestrian fatalities found the cause of death was massive blunt trauma in 88% of cases. This is explained by the fact that an enormous amount of kinetic energy is transferred to the body when a train strikes.

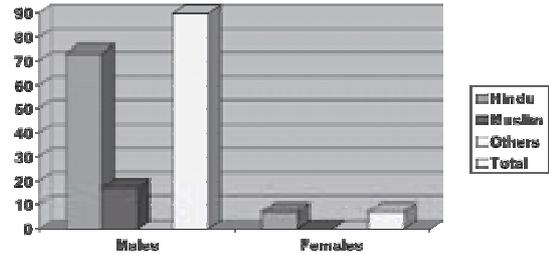
In our study most of the victims who succumbed to death due to railway injuries belong to Hindus followed by Muslims (Table 3 and Fig. 3). This can be explained by higher density of Hindu population in the study region than other communities.

Majority of the railway deaths in our study were seen in married male individuals who earn bread and butter for their

Table 3:

Religion	Males	Females
Hindu	73	07
Muslim	17	00
Others	00	00
Total	90	07

Fig. 3:



families.

As most of the married males are employed, travelling from one place to another may end up being victims of railway accidents by neglecting the safety norms as mentioned by railway authorities.

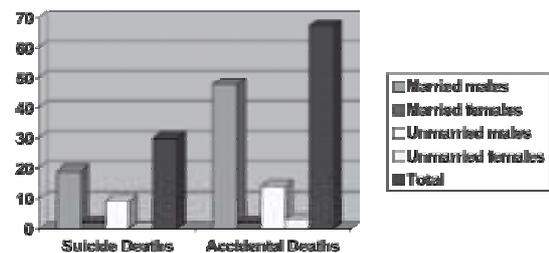
(Table 4 and Fig. 4)

Definite conclusion concerning the time of suicide and accidents cannot be drawn from our material which is rather

Table 4:

	Suicide Deaths	Accidental Deaths
Married males	19	48
Married females	02	02
Unmarried males	09	14
Unmarried females	00	03
Total	30	67

Fig. 4:



consistently distributed without showing any well defined cluster.

In the present study suicidal deaths are more among married individuals (Table and Fig. 4) emphasizing the role of post marital stress, familial conflicts, impaired social harmony and broken home causing depression and compelling one to end his life.

Conclusion

It can be concluded from the present study that accidental railway deaths in future can be reduced by implementing safety measures such as improved integrated surveillance system and safety engineering techniques, reduced public access to railway

Photograph

Photograph showing mutilation of the body with extrusion of abdominal viscera's upon impact of high velocity train and skin of lower limbs stained with grease and dirt from track and wheels of train.



tracks by strict vigil, security measures, and better law enforcement at stations. Greater public awareness needs to be created by educating the public about the dangers of railway trespassing. These measures, together with improved railway design may help to reduce the fatalities and financial loss incurred by the Railway department.

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Suicidal trends in children and adolescents

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Abstract

Birth and death are two inevitable truths. Person once born has to die one or the other day. As children and adolescents form future of the family, their deliberate death brings severe pain and agony to their parents and relatives. To evaluate the suicidal deaths in above mentioned population with respect to age, sex, methods adopted and reasons for termination of life, a retrospective study of 5 years from Jan'05 to Dec'09 was undertaken. Age was set according to the Indian law which considers children as up to 14 years and adolescents up to 18 years. Out of 2732 autopsies conducted at the mortuary, Government General Hospital Gulbarga, 34 cases were found to be of our interest.

Girls (70.6%) outnumbered boys (29.4%) in terms of deaths encountered. Common modalities observed were burns (12 cases), poisoning (11 cases), drowning (5 cases), Hanging (5 Cases), run over by railway (1 case). Major cause to commit suicide was depression and frustration, followed by broken families, academic failures, and love disappointment.

Key words

Suicide, Children, Adolescent.

Introduction

Deaths are always painful for families and friends, but are more tragic for others. Suicide, with its inevitable legacies of self discriminations, hurt, bewilderment, guilt relief and in expressible rage, plays particular havoc with the survivors. Saddest of all suicides are those of children, adolescents and young adults.

Suicides in particular to children and adolescents have something that makes death much more heart wrenching and pathetic. It brings with it an element of intense guilt, shame and at times anger among the family members along with normal pain, loss and agony that accompanies death and is considered stigma on the family by the society, when all the living organisms on this earth fight for survival and existence, what really drives the person to take such a violent self destructive step remains a mystery. Medrad boss has said "Flight from death is mere survival and flight into death is suicide".¹

Suicide is the common pathway of diverse circumstances of an independent network rather than an isolated cause, a knot of circumstance tightening around a single time and place with the result of sign symptom trait act.²

The history of suicides reflects the suicide of mankind and has existed as form of behavior since the dawn of civilization and is as old as human race; it is probably as old as natural death almost as old as murder.³

Notwithstanding the trauma the family members face, suicide is posing a major health problem and a drain on our

economy with the loss of useful reproductive human resources. The emergency wards of every public and private health care institution especially the burns ward are sure reckons of these tragic occurrences. The suicides has thus become a salient yet unrecognised pandemic.

Nils Ritterstol views suicide as the most personal act any one can perform which affects not only the single individual who takes his life but also the person's immediate circle and the local community⁴. Even though it is an accepted fact that no single cause or a group of causes can give a complete explanation about suicide rate, certain factors like male sex, increasing age, mental disorders, physical illness, widowhood, single or divorced state, childlessness, high density of population, residence in big cities, high standard of living, economic crises, alcohol and addictive consumption, broken home in childhood have found to be positively correlated with high suicidal rates⁵. Teenage suicide bombers have also propped in recent years⁶. Looking at their cognitive immaturity, hampering emotions of desperation as well as planning, many people take undue advantage and recruit them as suicide bombers. Human suicidal behaviour is always been a source of dread and wonder to mankind⁷.

Materials and Methods

This research activity was carried out retrospectively from January 2005 to December 2009 on the dead bodies brought to the mortuary at Govt general Hospital Gulbarga. The autopsy records of all the cases which includes inquest papers, case diaries, opinion of the autopsy surgeon, were examined for the suicides of persons upto 18 years of age during the five year period.

The age range was set with reference to the Indian law which regards persons up to 14 years as children, person up to 18 years as adolescents.

The bodies that were partially or totally decomposed where the cause & manner of death cannot be ascertained were excluded from the study. Illicit drug overdose and in deaths due to drug addiction were excluded because of the difficulties to unequivocally establish the manner of death to be accident or suicide.

Results

This study reveals 34 suicides of victims upto 18 years, of which 9 males(26.5 %) and 25 females (73.5%) out of 2732 autopsies conducted during the five year period.

A detailed survey is given in table.

As far the age distribution is concerned our material includes 3 children(1 male of 13 yrs, 2 females of 14 yrs) and 31 adolescents(9 males- 2x15 yrs, 2x16 yrs, 3x17 yrs, 2x18 yrs and 22 females- 3x15 yrs, 9x16 yrs, 4x17 yrs, 6x18 yrs).

Applied methods of suicides includes hanging (5 cases), poisoning (11 cases), drowning(5 cases), run over by railway(1 case) & burns(12 cases).

As far as the time of suicide is concerned, 5 suicides were in the hours of night, 9 in the morning, 3 in the afternoon & 11 in the evening hours. In 6 cases time of suicide act cannot be determined as the investigating officer was not sure of the happening of the incident. In these cases the time of suicide

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was mentioned in several hours probably based on the enquiry with the relatives and friends of the victim and also based on last contact with the relatives and friends and the discovery of the deceased.

As far as distribution of weeks are concerned 6 suicides occurred on Monday, 3 on Tuesday, 5 on Wednesday, 4 on Thursday, 5 on Friday, 2 on Saturday and 4 on Sunday. In 5 cases reliable data was not available.

With regards to seasonal variations 3 were encountered in January, 1 in February

3 in March, 6 in April, 5 in May, 1 in June, 4 in July, 3 in August, 2 in September, 3 in October, 1 in November, 2 in December.

With respect to place of committing suicide, 26 victims committed suicide in their homes, 8 committed outdoors. Victims those who committed suicide outdoor includes 5 cases of drowning, 1 case of hanging, 1 case of run over by train, 1 case of poisoning.

In all the cases of poisoning during the autopsy, the organs were retrieved and sent for toxicological analysis and subsequently poison was detected & found to be organophosphorus or organochlorine compounds. However in 2 cases of drowning, though the organs were collected preserved & sent to FSL for detection of poison, the results

were negative.

Regarding social and psychological background, from our study it was analysed that most of the cases were from disturbed family relationships, alcohol abuse, academic failures, step motherly treatment and depression as a reason for committing suicide.

Notes of suicide were found in three cases.

Discussion

As not much research and comprehensive study on suicides in children & adolescents in India is available. Conclusion from the material presented should be drawn with caution considering the relatively very small number of cases present. In particular with regards to social & psychological background to know the possible reasons for committing suicides, it has to be taken into consideration that the data were obtained from the PM reports, inquest papers, and case dairies. These sources document the results of investigation by police officer, postmortem reports and opinion of the autopsy surgeon on arriving at a conclusion in determining the cause and manner of death.

As for as the distribution of age is concerned, very few cases(8.8%) of suicide were found in children & increasing

Table:

Age in yrs	sex	Religion	Method	Reasons for committing suicide
13	M	Hindu	Poisoning	Broken home, alcohol abuse by father, physical torture by step mother.
14	F	Hindu	Poisoning	Upset because of onset of painful menstruation.
14	F	Hindu	Hanging	Grief because of sudden death of her father.
15	M	Hindu	Poisoning	Unable to cope up with studies at school & lack of communication with friends.
15	M	Hindu	Run over by train	Failure in exams
15	F	Hindu	Burns	Low level of confidence & poor performance in academics.
15	F	Hindu	Poisoning	Frequent tussle between parents & physical torture by parents (beating). Alcohol abuse by father.
15	F	Hindu	Burns	Motive for suicide unclear
16	F	Hindu	Burns	Securing low percentage in SSLC & emotional depression.
16	M	Hindu	Poisoning	Antisocial behavior with history of previous suicidal attempts.
16	M	Hindu	Drowning	No compelling motive
16	F	Hindu	Burns	Quarrel with mother(petty reasons)
16	F	Hindu	Burns	Alcoholic father torturing both mother & daughter
16	F	Hindu	Poisoning	No motive documented
16	F	Hindu	Burns	Broken home & torture by step mother.
16	F	Hindu	Hanging	Quarrel with siblings for petty reasons
16	F	Hindu	Poisoning	Forced to marry & not allowed for further education.
16	F	Hindu	Burns	Unable to bear false allegations of sexual affair with a person by her neighbours .
16	F	Hindu	Burns	No compelling motive
17	F	Hindu	Drowning	Psychiatric illness with history of previous suicidal attempts.
17	F	Hindu	Burns	Disappointing end to her love affair.
17	F	Hindu	Poisoning	Neglected by her friends & parents due to poor performance in studies.
17	F	Hindu	Drowning	Forced to marry a person, not of her choice.
17	M	Muslim	Burns	Unable to clear PUC exams as evident from his suicide note
17	M	Muslim	Burns	Severe pressure from parents to work, earn money and lack of job opportunities.
17	M	Hindu	Drowning	Poverty and lack of job opportunities.
18	F	Hindu	Poisoning	Cancellation of her fixed marriage leading to major depression.
18	F	Hindu	Poisoning	Severe depression due to sudden death of her mother.
18	F	Muslim	Burns	Depressed due to False allegations by the relatives regarding her family.
18	F	Hindu	Hanging	Sexual abuse by her neighbor & lack of support from her parents.
18	F	Hindu	Burns	Motive unclear.
18	F	Hindu	Hanging	Failed to clear her PUC exams & forced to marry as mentioned in suicide note
18	M	Hindu	Hanging	Renticite, staying alone, low performance in studies, poor memory. Left a suicide note.
18	M	Muslim	Drowning	Motive not clear

prevalence in adolescents was encountered from our material which are in good agreement with the studies conducted by other authors^{8,9,10,11}

On the other hand suicide rate in these age groups has been reported to increase⁷⁻¹²

In a study conducted by Essen institute of Forensic Medicine (1980-1989) 14 suicides of children were found, involving 9 girls and 5 boys aged between 11 – 14 years. The methods applied comprised of hanging in 1 case, running over by train-2 cases, jump from height and intoxication combined with hypothermia. The motive behind the death of all these children was found to be conflicts at school¹³.

A Comprehensive review of 392 suicide cases among youths and young adults, 15 through 24 years of age from Paris, (1989-1996) established as profile at greatest risk for suicide. Suicide under the age of 18 yrs in South Carolina^{12,14} involved mainly males who inflicted themselves gun shot wounds(78%) within close vicinity of their homes . 81% had a documented history of psychiatric disorders in 26% and of previous suicide attempt in 13% and left suicide notes in 19%.

In yet another study conducted by P.Schmidt¹⁵ from Bonn institute of Forensic medicine, who retrospectively analyzed from 1989-1998 and found suicides involving 23 males (62%) and 14 females (38%) victims in the age range of 10-21 yrs. Prevalence sharply increasing in adolescents and unexceptionally applied hard methods of committing suicides like hanging, running over by a train and jump from height. This can be explained by the fact that children usually do not develop the first indistinct ideas of the nature and definitiveness of death before the age of 7 or 8 years and do not get a more reliable insight in the phenomenon before the age of 12 or 14 years^{16, 17}.

Further more their cognitive immaturity hampers emotions of desperation as well as the planning ahead of the suicidal act. In comparison with the adolescents, children are better protected against contemplating and planning suicide by the lower incidence of depressive disorders, the higher extent of family care & warmer relationship to the parents¹⁸. The conclusion that can be drawn is that children are not more resilient, but are less exposed to risk factors and for that reasons have lower suicidal rates compared to their counterparts who often get shattered by the turbulence of life more easily and opt for deliberate self harm over trivial issues and sometimes even the intention to kill themselves.

From our material, girls (73.5%) outnumbered boys (26.5%) in committing suicides which is in contrast with the studies conducted by D.A.Brent⁸, H.M.Hoberman¹⁰, and PC Holinger¹¹ who found a distinct male preponderance. The reason contributing for this high rate of suicide is that, girls in our society are deemed fit for household work, given less education, more work and responsibility, less care & affection than their counterparts.

Definite conclusion regarding time & season of suicide cannot be drawn from our material as they are being rather consistently distributed without showing any definite cluster. This is line with the majority of the data reported in the literature which do not either indicate a clear tendency^{10,16, 18}.

As for mode of death is concerned, majority of cases (12xburns) from our material has adopted hard method of committing suicide, thus exhibiting a high degree of autoaggressive and self destructive behavior.

A higher proportion of self poisoning cases were also noted (11 cases) among girls in our material which is comparable with the literatures reported^{16,17,19}. Self poisoning employed by girls as a soft method of committing suicide can be attributed by the fact that pesticides & insecticides which are used to spray in agricultural fields in our country through out the season makes readily available in the vicinity and lack of stringent laws regarding their sale, purchase, storage, use & disposal of these toxic materials makes it very easy for the

individual to take the extreme step. Thus the aids of equipment are easily available, cost effective, fast acting which makes the person to translate the decision impulsively without preparation and delay in action.

As place of committing suicide is concerned, most of the victims have committed suicide within their residence (76.5%) which is consistent with the literatures reported^{20,21,22}. The person usually finds lone & close vicinity, which is familiar to the victim particularly their parental house or surroundings. This provides easy access to the necessary implements & makes possible the commitment of suicide within a short time leaving no opportunity to reconsider the decision²¹.

As a matter of social & psychological background majority of the victims showed depressive disorders which is in comparison with the study conducted by the majority of the authors^{8,10}, followed by broken home situations and alcohol abuse¹¹.

From the detail survey, suicide note was found in 3 cases (8.8%). Which is lesser as compared to the study conducted by Jeff Lee et al²¹, Mc Gover et al²³ and Lecomte²⁴ where suicide notes were found in 19%, 35% and 40% of the cases respectively. This could be due to lack of intellectuality and illiteracy of the person to materialize on the paper what was going on in his mind prior to the act.

Suicide note forms an essential component of psychological autopsy. These notes play an important role in confirming the cause of death. Suicide notes are communication written typically at the time just before the fatal suicidal act. They represent the end products of perhaps, years of despair in the final frame of hopelessness. These notes serve as windows to the mind of the deceased. As Forensic Pathologists need to be aware of common scenarios, risk factors and methods as well as pitfalls, to properly assess the cause and manner of death in these fatalities.

Conclusion

From the above study it can be concluded that though the incidence of suicide in children and adolescents is less, possibilities cannot be ruled out. All they need is proper grooming, good education, psychotherapy, warmer care, love and affection from their dear ones. This may help the different professionals actively involved with the problem of suicide though not for its complete prevention but at least for reduction in the rate of suicide to a minimum.

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Structural damage in the neck in cases of death due to ligature strangulation

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Abstract

Death from hanging and ligature strangulation are commonly encountered in medico legal autopsy, distinction between these two forms of mechanical asphyxia is of utmost important in furnishing opinion as to the manner of death. Prevalence of hanging and ligature strangulation cases by their ratio and structural damage in neck structures among these cases were studied in this research work done at mortuary attached to Victoria Hospital BMC Bangalore for the period of two years. Autopsy findings are noted and conclusions were drawn. Only 23 [3.41 %] cases of ligature strangulation against 673 cases of hanging, indicating hanging is more common than ligature strangulation. Male to female ratio of hanging cases is 7:5 and that of strangulation cases is approximately 7:5. Structural damage in neck structures in cases of ligature strangulation is invariably present in all the cases unlike hanging cases. Unusual contusion of soft tissues in the neck in case of death due hanging should be ruled out beyond reasonable doubt. Extensive structural damage in the neck structures in case of death due to Ligature strangulation is the rule.

Key words

Ligature strangulation, Structural damage, Compression of neck, Asphyxial death.

Introduction

Death due to compression over the neck by ligature may be of two types hanging and strangulation. Day to day medico legal practice obliquity of ligature mark over the neck and external signs of physical violence will assist in deciding whether the given case is of suicidal or homicidal Asphyxial death. Application of grater physical violence over the neck by ligature results in structural damage in neck structures which is also corroborative evidence for deciding the manner of application of pressure over the neck. Hence this study was under taken to study rate of structural damage in neck structures due to compression over the neck at department of Forensic Medicine Victoria Hospital BMC Bangalore

Objectives of the study

This study was under taken to know

1. Ratio of hanging cases to ligature strangulation
2. Sex wise distribution of ligature strangulation and hanging cases.
3. Structural damage in neck in cases of ligature strangulation.

Materials and methods

The present study was done on all the cases that are autopsied at department of Forensic Medicine, Victoria Hospital mortuary from August 1994 to July 1996 were screened for compression over the neck by ligature material. These cases were subjected for the bloodless tissue dissection by standard protocol of dissection of head, thorax and abdomen first, and dissection of the neck later. Meticulous dissection of the tissues

in the neck layer by layer and recording of the gross examination findings of structural damage in the form of contusion of soft tissues, rupture of cartilages or fracture of hyoid bone were done. The cases showing advanced signs of decomposition were excluded.

Observations and results

Chart showing total cases of autopsy to Asphyxial deaths, Hanging strangulation and ligature strangulation

Chart showing total cases of autopsy to Asphyxial deaths, Hanging strangulation and ligature strangulation

Total autopsy	Total cases asphyxial deaths	Total cases of Hanging	Total strangulation cases	Ligature strangulations
7348	719	673	46	23
%	9.78	93.60	6.83	50

Chart showing Manner of strangulation

Total cases	Suicidal	Homicidal	Accidental
46	0	45	1
Percentage	0.00%	97.83%	2.17%

Ratio of hanging cases to ligature strangulation.

Total cases	Percentage
Hanging	673
Ligature strangulation	23
	3.41

Chart showing sex-wise distribution of manner of strangulation.

Ligature strangulation	
Male	Female
13	10

Structural damage in the neck structures in all the cases of ligature strangulation

Total	Skin Platysma	Soft tissues at level of thyroid gland	Thyroid gland	Hyoid bone	Thyroid cartilage
23	13	13	9	0	0

The chart showing male to female Ratio of Hanging and strangulation cases.

Hanging			Ligature strangulation		
Male	Female	Total	Male	Female	Total
393	280	673	13	10	23
58.4 %	41.6 %		56.6 %	43.4 %	

Discussion

Total 7348 medico legal autopsies were conducted in the department of Forensic Medicine & Toxicology Victoria Hospital BMC Bangalore for the period of two years from August 1994 to July 1996. Total 719 [9.78 %] cases were of death due to mechanical asphyxia , out of which 673 [93.60 %] cases were of hanging, 46 [6.83 %] cases were of death due to strangulation. Among the death due to strangulation, 23 [50

%] cases were of death due to ligature strangulation.

Out of total 46 cases of strangulation, 23 [50%] cases were of death due to ligature strangulation indicating death due to ligature strangulation is more common than any other modes of strangulation. Among 46 cases of death due to strangulation as per history furnished by the police and autopsy findings none of the cases were of suicidal strangulation and hence it is well said dictum that '*strangulation is always homicidal unless otherwise the contrary is proved beyond reasonable doubt*'. Only one case of accidental strangulation was found, where in compression over the neck was brought out by cloth caught in a moving machinery , other wise all other cases were of homicidal strangulation. Looking at the victims of ligature strangulation 65% of cases were male 35% cases were female, male is more common victim than female because of economically productive and decision maker when compared to female's in the society.^{1,2}

Structural damage in the neck structures due to ligature strangulation as compared with available common text book. Bruising of soft tissues of the neck and muscles especially underneath the ligature mark is more common in ligature strangulation than hanging.¹⁻⁸

Also structural damage in the form of contusion of thyroid gland was next most common structural damage [9 out of 23 total cases] found in the present study which is consistent with Nandy A findings.³ In any of the cases, there was no fracture of hyoid bone, even in ligature strangulation, the hyoid bone escapes either above or below the ligature material.⁴

Conclusion

1. Only 23 [3.41 %] cases of ligature strangulation against 673 cases of hanging, indicating hanging is more common than ligature strangulation.
2. Male to female ratio of hanging cases is 7 : 5 and that of strangulation cases is approximately 7 : 5

3. Structural damage in neck structures in cases of ligature strangulation is invariably present in all the cases unlike hanging cases. Unusual contusion of soft tissues in the neck in case of death due hanging strangulation should be ruled out beyond reasonable doubt.
4. Extensive structural damage in the neck structures in case of death due to Ligature strangulation is the rule.

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Precautions against infection at autopsy

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Abstract

Hospitals can be as hazardous as some industrial settings with associated occupational health and safety risks. In recent years, they have come under increasing scrutiny, especially since the impact of microorganisms such as Hepatitis B and HIV on workers. Research, laboratory and autopsy procedures, in particular, pose a threat of acquiring infections of various types. It has therefore become mandatory for all hospital employees to observe precautions to safeguard against possible biological hazards at the workplace. This article would, hopefully, address the challenges and responsibilities in these areas.

Keywords

Occupational health, microorganisms, autopsy procedures, precautions, biological hazards

Introduction

The Autopsy Room is a potential source of infection for its workers, which include pathologists, technicians, and even medical students attending postmortem examination. A historical review reports a risk of infection from cuts and punctures of the skin in the early 20th century, Hepatitis B and C in the 1970s and HIV in the 1980s when we entered the period of high risk autopsies. According to Hardin et al, the chance of autopsy injuries are 1 in 11 amongst pathology residents; 1 in 55 amongst experienced pathologists¹

Precautions against specific organisms

1. Tuberculosis
2. Hepatitis B and C
3. Human Immunodeficiency Virus (HIV)
4. Cruetzfeld Jacob Disease (CJD)
5. Viral Haemorrhagic Fever

Tuberculosis

Tuberculosis is more prevalent among persons with HIV, the homeless, low socio-economic status, Intravenous Drug Users and ethnic groups from countries with high rates of TB. As far as autopsy pathologists are concerned, the prosector's wart (inoculation TB) is recognized as an occupational hazard². There is also a risk of spread through aerolization during autopsies of patients who had TB. In Japan, occupational related TB is 6-10 times higher for pathologists/ technicians, while in the U.K. it is 100-200 times more likely for staff of labs/autopsy rooms than public to develop TB.

Preventive measures would include education of staff, administrative and engineering controls, special ventilation recommendations, respiratory protection with HEPA (High Efficiency Particulate Air) filter masks, and post-exposure prophylaxis of workers.

During the postmortem examination, introduce 10% formalin into the unseparated lungs via the trachea. Immerse specimens in 10% formalin for 24 hours before further dissection. Avoid examining unfixed specimens. Sputum, pus, tissue samples and urine are handled as little as possible to

avoid splashing and aerosol formation. A few absolutely necessary instruments are used and autoclaved at the end of the session. Phenolic disinfectants are effective for tuberculosis.

TB testing and prophylactic medication, as indicated, are useful as preventive and control measures. Masking a body during handling and transport can minimize contamination to the immediate areas and attending staff. Other steps would be the restriction of traffic in the autopsy room, use of manual saws instead of power tools to reduce splashing of materials, and proper disposal of waste.

Hepatitis b and c

Occupationally acquired hepatitis has been recognized as a health hazard for more than 40 years. There is a risk of infection from blood-borne pathogens from needle-stick injuries and percutaneous exposure to blood. Needle-stick injury occurred once for every 2639 surgical specimens handled and for every 37 autopsies performed². Splash injuries to face and eyes and glove punctures were also reported. The risk of transmission for Hepatitis C after a single percutaneous exposure (2.7-10%) is less than that for Hepatitis B (30%). There is no evidence of spread of hepatitis by aerolisation¹. As the infectious status of a patient is not always known, it is important to adopt safe working practices at all times. Immunization against Hepatitis B infection is an effective means of protection against the disease in mortuary workers.

Human immunodeficiency virus (HIV)

Johnson et al.³ in 1997 reported autopsy-acquired HIV infection of a pathologist who sustained a scalpel wound of the hand. Researchers have isolated HIV-1 from brain 24 hours postmortem and from bone, spleen and blood upto 6 days postmortem. The risk of contracting HIV after a single percutaneous exposure to infected blood is 0.3%. Mucous membrane exposure carries less risk, approximately 0.09%. Post-exposure prophylaxis with Zidovudine decreases the odds of HIV transmission by 79% after percutaneous exposure. Preventive measures include wearing personal protective equipment such as face masks, safety glasses, scrub suit, gown, apron, cap, rubber boots and two pairs of gloves. Hypochlorites and glutaraldehyde are appropriate disinfectants for HIV autopsies.

General principles in control of infection with blood-borne hepatitis and hiv

- Apply good basic hygiene practice with regular hand washing between cases.
- Cover wounds and breaks in skin with waterproof dressings or gloves
- Prevent puncture wounds, cuts, abrasions, etc. and ensure they are not exposed
- Avoid sharps usage wherever possible
- Follow approved procedures for sterilization and disinfection of instruments and equipment.
- Follow approved procedures for safe disposal of contaminated waste
- Blood and body fluid spills are cleaned up promptly using absorbent material such as paper toweling that is then discarded into the infectious waste bag. Gloves must be

worn while cleaning. The area is washed with warm water and detergent and treated with sodium hypochlorite. Disinfectant solution is not allowed to pool on surfaces for longer than is required, usually about 3-5 minutes.

Procedure after death

- Mortuary workers should be warned that there is a potential risk of blood-borne virus infection from an infected corpse
- Known or suspected cases of infection should not be embalmed, as this puts the operator at risk.
- Principles of safe practice for the mortuary must be adhered to irrespective of the infective state of the body.
- Where a postmortem is required, all concerned must be suitably informed and trained in safe procedures.
- The body is placed in a disposable body bag. Absorbent material may be needed when there is leakage from surgical incisions or wounds.
- The use of "Danger of Infection" labeling is appropriate and attached in such a way that it can be read through the cadaver bag.

Cruetzfeld jacob disease (CJD)

A progressive, dementing illness, primarily affecting the central nervous system. The disease has an animal to human vector and is acquired by ingestion of beef from animals infected with bovine spongiform encephalopathy. Transmission in laboratory workers and morticians is through contact with samples of brain, spinal cord, meninges and cerebrospinal fluid. Blood and urine are infectious in humans.

In suspected cases of CJD, the corpse is cleaned thoroughly and all surfaces disinfected with 1 Eq/L Sodium Hydroxide. Autoclave instruments and small tissue samples for 1 hour at 120 C and 20 psi. 5% hypochlorite (bleach); phenols; iodine solutions and permanganate solutions are adequate disinfectants. Brain only autopsies may be performed over a flat shallow pan, using disposable instruments, in an autopsy table covered by double layer plastic sheets. Tissues for histology can be immersed in 95-100% formic acid for 1 hour.

After exposure, rinse with sodium hydroxide for several minutes and then with water. Instruments utilized for autopsy can be decontaminated by wiping or washing with soap and water before sterilization. Trash, sharps and tissue remnants are to be incinerated. Instruments may also be soaked in 0.5% sodium hypochlorite (10-fold dilution of household bleach) for 1 hour. Liquid waste, including wash water, should be contained and incinerated. There have been no reported cases of infection to pathologists in the last 25 yrs¹.

Viral haemorrhagic fever

In recent years, several new viruses have been discovered that can cause a potentially fatal haemorrhagic fever, which can affect laboratory workers, technicians and hospital staff. The disease is transmitted by close person-to-person contact and in blood, urine, faeces and body fluids. Risk of airborne spread is slight. Transmission in hospital staff is facilitated by inadequate barrier precautions, improperly trained staff and poor hygiene. The organisms are classified as dangerous biological agents and special care is needed while handling biological samples. A limited autopsy may be done in such cases, using personal protective equipment and applying safe work practices. During autopsy, towels are placed over bony projections to reduce risk of contamination and injury. Skin defects may be covered with occlusive bandages and rib ends with disposable pads. If exposure occurs, briskly clean skin with soap and water, wash eyes thoroughly and refer the worker to the Emergency Department.

Control and prevention

1. General Measures and Precautions
2. Administrative and Environmental Measures
3. Education and training of Staff

General measures and precautions

- No smoking, drinking or eating within the autopsy area to minimize chances of infection
- Hand hygiene – washing of hands with soap and water is recommended before and after each case; disinfection of hands with antimicrobial handwash in high risk cases.
- Barrier – anything that separates a person from a hazard and helps in preventing the import of contaminants (CDC, USA)⁴. The most efficient natural barrier is the intact skin. However, artificial barriers (drapes, dressings, etc.) may be required where there is risk of injury to the skin and mucous membranes.
- Personal Protective Equipment – specialized clothing and gear designed to protect the worker from hazards. These include caps, masks, eye shields, gowns, gloves, plastic aprons and rubber boots.
- Special Operative Procedures – regular cleaning and disinfection of inanimate hospital equipment, e.g. walls, floors, surface of medical equipment and furniture
- Immunization of mortuary staff against vaccine-preventable diseases such as Hepatitis B, TB and typhoid.

Administrative and environmental measures

- Facilities – an adequate facility with sufficient space, an appropriate floor plan, electrical, plumbing and cooling capabilities, and furnishing.
- Lighting needs to be bright to permit thorough examination and optimize safety
- Walls and floors should be made of non-porous material with adequate and rapid drainage for easy cleaning of these surfaces
- Dissection area should be of adequate size and design to allow safe working and easy cleaning.
- Proper drainage system to reduce blood and fluid accumulation
- Disinfect environment by fumigation or formalin aerosol
- Routine inspection of disinfection process, waste disposal, sharp instrument containers, product effluents and emergency preparedness
- Evaluation of work procedures for autopsy services
- Increased ventilation reduces exposure to inhalable hazards. Local exhaust ventilation is effective in mortuaries
- Surveillance includes (i) taking monthly swabs for culture from the environment, equipment, furniture, instruments and consumables and (ii) checking the bacterial load, type and antibiotic resistance
- Post-exposure prophylaxis for Hepatitis B and HIV
- Proper disposal of biomedical waste

Education and training of staff

- Pathologists, technicians and mortuary staff who perform or take part in autopsies should exert caution to prevent cuts, needle punctures and mucocutaneous exposure to splashes.
- The routine use of double gloves is recommended to protect the hands from scalpel wounds, especially in high risk cases.
- Minimize the use of fingers during procedures, try to handle tissues with instruments as far as possible; direct handling of organs is avoided
- Hand saws are preferred over power tools due to less

- exposure to bone dust and aerolization.
- Safe transport of specimens in completely sealed leakproof containers appropriate for contents is carried out. Hazard labels are attached if necessary.
- Request forms are filled in as fully as possible with indication of risk attached with any specimen.
- Personnel with open wounds in areas that could be easily contaminated should not participate in high-risk autopsies
- Disposable gowns, aprons, masks, etc. are discarded at the end of the procedure
- Contaminated masks are changed immediately
- Contaminated underclothing or shoes are soaked in 1:10 dilute solution of chlorine bleach and washed.
- Needles are not to be recapped but disposed off as per hospital guidelines.
- First-aid equipment should be in place with clear instructions concerning what to do in the event of accidental self-injury, splashing of mucocutaneous sites and spilling of hazardous material.

Conclusion

The ultimate goal is to protect all mortuary staff from the risk of exposure to infectious agents at work. This can be achieved by appropriate use of personal protective equipment in conjunction with administrative controls and education. In the event of exposure despite proper preventive measures, a program to respond promptly to the situation should be available. The autopsy room would surely be a safer place to work in if all the aforementioned precautions are observed conscientiously by one and all.

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Endosulfan poisoning precipitating as nephrogenic diabetes insipidus: A case report

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Summary

Endosulfan is a chlorinated hydrocarbon, widely used as an insecticide. Acute poisoning can have multisystem involvement & even renal failure. We are reporting a case of endosulfan poisoning precipitating as nephrogenic diabetes insipidus (NDI), after being admitted in a state of altered consciousness, vomiting, and seizure. The diagnosis of NDI was suspected due to symptoms like polyuria and thirst, developing on the second day of admission; confirmation was done by antidiuretic hormonal assay and positive water deprivation test. We emphasize that, if there are symptoms like polyuria and thirst in a case of endosulfan poisoning, the diagnosis of NDI should be considered as one possibility when etiology is not certain.

Introduction

Endosulfan is a chlorinated hydrocarbon, widely used as an insecticide. Acute poisoning can have multisystem involvement & even renal failure. Here we are reporting a case of endosulfan poisoning precipitating as nephrogenic diabetes insipidus, on 2nd day of admission.

Case history

A 28-year-old male with no significant past medical history was brought to the emergency department, in a state of altered consciousness, vomiting, and two episodes of seizure. An empty bottle labeled: Akodan 35 (Endosulfan 35%) was collected by the police next to the patient at the site of the incident. On examination, he was hypotensive with a blood pressure (BP) of 82/44 mm Hg and a heart rate (HR) of 142/min. He was afebrile, tachypnoeic and had a Glasgow coma score of 8. There was no rigidity in neck flexion and reflexes were normal. Chest skiagram and electrocardiogram were unremarkable.

The patient was rehydrated with 1 liters of intravenous isotonic saline (0.9%) over 20 minutes and with continued rehydration his blood pressure returned to 110/76 mmHg within 30 minutes. To manage hypoxia, invasive positive pressure ventilation was given (continuous positive airway pressure/pressure support mode). The patient was treated with gastric lavage and 30 g of activated charcoal slurry through nasogastric tube. Gastric content had a sulphur odor and was sent for toxicological screening. Midazolam (continuous infusion of 0.05 mg/kg/hr) and sufentanil (continuous infusion of 0.5 µg/kg/hr) infusion was started for sedation, analgesia and seizure prophylaxis. Initial laboratory results revealed elevated urea, creatinine, creatine kinase, and liver enzymes (table 1). No further episodes of seizure occurred, and patient was extubated 16 hrs after admission. He subsequently reported that he had tried to commit suicide by taking 1 spoonful of Akodan 35 (Endosulfan 35%). However, he

developed polyuria and thirst after 24 hr of admission. Drugs administered until this point were midazolam, sufentanil and thiopentone. On further evaluation, laboratory values were measured as: ionic calcium of 1.15 mmol/L, urine osmolality 72 mOsm/L H₂O, serum antidiuretic hormone of 38 pg/mL (normal value <8 pg/mL), while abdominal ultrasound, thyroid and parathyroid profile revealed a normal study (table 2). Water deprivation test was done, which confirmed it to be NDI. Thereafter, hydrochlorothiazide + indomethacin therapy (2 mg/kg/day in three divided doses for both drugs) was started, along with the restriction of daily solute (salt <100 mmol/day) and protein intake. In response to above therapy, urine output decreased from 10 L/day to 4.4 L/day (56% decreases) and vasopressors were also tapered off over the next 24 hrs. Subsequently, urine output of 70 ml/hr was achieved in the next 24 hrs and serum enzymes also returned to normal subsequently. (table 2) His 4 day later EEG showed bilateral synchronized intermittent delta activity, however CT scan was normal. He had no further complications and was discharged on fifth day of hospitalization. He was advised to take Sodium valproate for the next 2 wks and was shifted to psychiatry clinic. The diagnosis of endosulfan poisoning was confirmed by history, physical examination and positive reports from toxicological screening. On the follow-up, patient's mean daily urine output was 65 ml/hr/day over the next 2 wks, with a urine osmolality 254 mOsm/L H₂O.

Discussion

Endosulfan is a highly toxic, chlorinated, cyclic hydrocarbon widely used as an insecticide in agriculture fields of this country. Route of exposure is usually oral, inhalational, and dermal. It is well known to cause gastrointestinal symptoms, metabolic disturbances, convulsions, hepatic and renal toxicity. (1) Cardiac arrhythmias may occur owing to myocardial sensitivity to catecholamine excitation. Pulmonary insufficiency may also precipitate secondary to aspiration or pulmonary oedema.

Acute toxicity is usually manifested by neurological overstimulation leading to convulsions, headache, dizziness, ataxia and myoclonus. It is due to its inhibitory effect on Ca- and Mg-ATPase; thereby, antagonizing gamma-aminobutyric acid (GABA) receptors, resulting in only partial repolarization of the neuron and a state of uncontrolled excitation. (2) Cause of death is usually hypoxia, secondary to status epilepticus. Benzodiazepine is preferred over phenytoin for control of seizure, due to the effect of endosulfan on GABA receptors. In our study, midazolam infusion was given for seizure prophylaxis and no further episodes of seizure occurred. Predominant gastrointestinal symptoms include nausea, vomiting, abdominal pain and sometimes even diarrhea. The percentage of absorption after oral ingestion is moderate to high. Gastric lavage and activated charcoal slurry has been documented as an emergency management by different studies. (1)

Endosulphan is known to augment lipid peroxidation, increased production of superoxide and a significant alteration in glutathione redox cycle in neural and hepatic tissues of rats leading to cell necrosis. (3) Hepatotoxicity may manifest as elevation of AST/ALT, hepatomegaly and even focal fatty degeneration or liver fibrosis. It can even cause rhabdomyolysis

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Table 1: Arterial blood gases

Test (units)	On admission	Post resuscitation	24 hrs later	Reference range
pH	7.19	7.32	7.41	7.35-7.45
paCO ₂ (mmHg)	42.6	39.9	35.1	35-45
paO ₂ (mmHg)	113.8	111.0	244.3	80-100
HCO ₃ ⁻ (mmol/l)	16.1	20.2	22.1	20-30
Base excess (mmol/l)	"11.6	"5.4	"2.0	-3 " +3
Anion Gap (mmol/l)	22	21.9	11	3-11

Table 2: Lab investigations

Test (units)	Admission	2 nd Day	3 rd Day	4 th Day	Reference
Hemoglobin (mg/dl)	11.0	-	9.2	-	11.5-17.4
Total leukocyte count (cells/dl)	7600	-	7500	-	4,000-11,000
Blood urea (mg/dl)	45	58	67	40	7-20
Creatinine (mg/dl)	1.6	2	2.2	1.1	0.6-1.2
Random Blood sugar (mg/dl)	124	96	102	104	
Sodium (meq/l)	133	139	145	140	135-148
Potassium (meq/l)	4.4	3.4	4.3	4.5	3.5-4.5
Plasma osmolality(mosmol/l H2O)	321	330	317	300	285-295
Serological test/culture			Sterile		
CK (U/L) *	446	489	467	202	60-400
CK-MB (ng/ml)	4	5	4	-	0-7
Troponin I (ng/ml)	0.01	0.008	0.012	-	0-0.02
AST (U/L) †	102	152	185	36	0-35
ALT (U/L) ‡	153	186	212	40	40-35
LDH (U/L) §	184	240	435	206	115-221
Serum total bilirubin (mg/dl)	0.7	0.8	1.2	0.8	0.3-1

*CK=creatinine kinase, †AST= alanine aminotransferase, ‡ALT= aspartate aminotransferase, §LDH=lactate dehydrogenase.

at higher doses. (4)

Renal toxicity is manifested by inhibition of mixed function oxidase activity leading to degenerative changes in convoluted tubules and even acute tubular necrosis of the tubular epithelium and renal failure. (5,6) Our patient presented with mildly elevated levels of urea and creatinine at the time of admission, which increased moderately up to the third day. It signifies renal involvement in this case. However, he developed polyuria and thirst from second day of admission signifying onset of NDI. Midazolam, thiopentone and sufentanil given to this patient, are not known to be associated with renal failure. Cause of NDI in our case could be therefore endosulfan, as no other risk factors were detected in history and investigations. Restricted solute intake, reduced protein intake, indomethacin and hydrochlorothiazide therapy have been considered ideal treatment regimen for NDI. (7) Studies on hydrochlorothiazide (1.5– 2 mg/kg per day), indomethacin (2 mg/kg per day), and a low salt diet (1 mmol/kg per day) have reported mean daily urine flow reductions of 38, and 46%, respectively. (8,9) In our patient after the initiation of treatment, baseline urine levels were achieved in 48 hrs and he had no further complications.

We emphasize that, if there are symptoms like polyuria and thirst in a case of endosulfan poisoning, the diagnosis of NDI should be considered as one possibility when etiology is not certain.

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Profile of accidental fall from height in children: One year study

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Abstract

In children and young adults, trauma is one of the leading causes of morbidity and mortality, especially those resulting from fall from height. Study of cases of fall from height will help in the formulation of policies to prevent occurrence of such incidents. In this study, out of 188 cases of accidental fall from height, 43 cases (23%) were of those involving children. Cases involving boys (60.5%) were more than girls (39.5%). Majority of the victims were in the school going age group (65.1%). Most of the falls occurred in the month of April (16.1%) and between 12 noon to 6 pm (58.1%). Maximum number of falls were from staircase (25.6%) and the most commonly involved region was head and face (60.5%). The overall survival rate was 95% with only two deaths.

Keywords

Fall from height, accident, children, prevention, staircase, mortality.

Introduction

Trauma is one of the leading causes of morbidity and mortality in children and young adults.¹ Among all causes of trauma, falls from height are considered the most common. Children are more prone to fall from height because of insufficient development of sensory systems, neural control mechanisms, and cognitive ability in terms of hazard awareness and avoidance skills.² Young children are generally susceptible to accidental fall from height because of their innate desire to explore their world and the inability to perceive the dangers of their actions. Fortunately, falls from height in children are rarely fatal. However, they cause significant morbidity and burden on the health care system around the world. According to the World report on child injury prevention, non-fatal falls are the 13th leading cause of disability adjusted life years lost among children under 15 years.³ Study of cases of fall from height not only help in knowing the profile of such cases in the community and also help in formulating policies to prevent occurrence of such incidents.

Materials and methods

In the present cross-sectional study, all the cases of accidental fall from height involving children admitted to the KLE's Dr.Prabhakar Kore Hospital & MRC, Belgaum, during the period from 01-01-2009 to 31-12-2009 were included. Cases of falls from animals, vehicles, burning buildings, falls into water and machinery were excluded from the study. Study was carried out to know the profile of accidental fall among children. They

were divided into four age groups as, infants (less than 1 year), toddlers (1-3 years), preschool children (3-6 years), and school going children (6-14 years). Information regarding age and place of residence were obtained from the medical records. History of type/ place of fall, time of fall were obtained by direct interrogation with the patients and/ or their parents. Patients were examined and injuries sustained were recorded. All the data collected are analysed with respect to the objectives of the study.

Results

During the study period, total of 188 cases of accidental fall from height were admitted to the KLE's Dr.Prabhakar Kore Hospital & MRC, Belgaum. Out of these, 43 cases (23%) were of those involving children. Cases involving males (26 cases; 60.5%) were more than females (17 cases; 39.5%) [Table 1]. Maximum number of cases were in the school going age group (28 cases; 65.1%) and minimum in the infants (4 cases; 9.3%) [Table 1]. Majority of falls occurred during summer (41.8%) with maximum cases in the month of April (7 cases; 16.1%) [Table 2]. More than half of the falls (25 cases; 58.1%) occurred during the afternoon and evening hours (12 noon to 6 pm period) [Table 3]. Most of the victims (28 cases; 62.8%) were from urban areas [Table 4]. Majority of the falls were from staircase (11 cases; 25.6%), followed by tree (8 cases; 18.7%) and least from the windows (1 case; 2.2%) [Table 5]. Head and face was the most commonly involved region (26 cases; 60.5%), followed by extremity (8 cases; 18.7%) and in 6 cases (13.9%) more than one body region was involved [Table 6]. Out of the total 43 cases, only 2 (4.7%) children died due to the head injury sustained by them.

Discussion

Falls are the leading cause of non fatal injury in children. As per WHO, fall is an event which results in a person coming to rest inadvertently, on the ground or floor or other lower level.³ Falls are the most common type of childhood injury presenting at emergency departments, accounting for 20-25% of such visits.³ Falls from height are the most common cause of admission to the emergency department during childhood, and are the fourth leading cause of trauma deaths.¹

In the present study, number of cases involving males were more than females ratio being 1.5:1. This could be due to the more careless and risk taking behavior of male children than female children. In addition, the variation in the male: female ratio of the population can also contribute to the male preponderance of cases. Similar result is also observed in other studies.^{4,5,6,7} In this study, majority of victims were school going children (65%). Children of these ages are usually more active

Table 1: Age and Sex wise distribution of cases:

Age	Male	Female	Total	
			Number	Percentage
Infant (< 1 year)	03	01	04	09.3
Toddler (1-3 years)	03	04	07	16.3
Preschool Children (3-6 years)	02	02	04	09.3
School going Children (6-14 years)	18	10	28	65.1
Total	26 (60.5%)	17 (39.5%)	43	100

Table 2: Month wise distribution of cases:

Month	Number	Percentage
January	04	09.4
February	05	11.7
March	03	06.9
April	07	16.1
May	03	06.9
June	04	09.4
July	05	11.7
August	02	04.7
September	03	06.9
October	03	06.9
November	02	04.7
December	02	04.7
Total	43	100

Table 3: Distribution of cases based on time of fall:

Time	Number	Percentage
6 am-12 noon	07	16.3
12 noon-6 pm	25	58.1
6pm-12 mid night	11	25.6
12 midnight-6 am	00	00.00
Total	43	100

Table 4: Distribution of cases based on place of residence (urban/ rural):

Residence	Number	Percentage
Urban	28	62.8
Rural	15	37.2
Total	43	100

Table 5: Distribution of cases based on Type/ Place of Fall:

Type/ Place	Number	Percentage
Roof top	05	11.6
Staircase	11	25.6
Balcony	04	09.3
Bed/ Crib	04	09.3
Chair/ Furniture/ Playing equipment	06	13.9
Window	01	02.2
Wall	02	04.7
Ladder	02	04.7
Tree	08	18.7
Total	43	100

Table 6: Distribution of cases based on Injury to the body region:

Body Region	Number	Percentage
Head & Face	26	60.5
Neck	00	00.0
Thorax	01	02.2
Abdomen & Pelvis	02	04.7
Extremity	08	18.7
More than one region	06	13.9
Head & face and Extremity	:04	
Thorax and Abdomen	:01	
Thorax and Extremity	:01	
Total	43	100

than other children and are not all the time under their parent's supervision. They are more prone to accidental fall at school also. In other studies average age of the children was 8.9 years⁸ and 7.4 years.⁴

In this study, most of the children (63%) were of urban areas. This could be attributed to the fact that children of urban areas are more exposed to the dangerous places like balcony, staircase, rooftops etc. In addition, parents of urban children

usually go out for jobs and thus making children free from the constant supervision of their parents. Falls in the urban setting are a common cause for emergency room visits in children and adolescents.⁹

In our study, most of the falls occurred during summer i.e between February and May with maximum cases in the month of April. These months being the period of study vacation, children generally spend most of their time in playing both inside and outside the home. Our result is similar to the result of other studies.^{4,7} In this study, it was observed that maximum number of falls (58%) occurred during the period 12 noon to 6 pm which is the usual playing time for children.

Falling downstairs was the most common type of fall in this study and same was the result in another study at United States.¹⁰ However, results of other studies show that there is no steady similarity in the type of fall.^{1,5,11,12} Results of these studies indicate that children are prone for any type of fall from any structure. Type of fall also depends upon the age of the child. Infants usually fall from crib; toddlers from playing equipments; preschool children generally fall from windows, staircase, and older children from dangerous play areas such as rooftops, tree, balcony etc.

In the present study majority of the children suffered injury to the head and face region (61%). Other studies also observed that head was the most commonly injured body region.^{1,4,11} In this study, only 2 children (4.7%) died and both of them had injury to the head. This is very much similar to other studies.^{4,5,11} Though falls from height are the commonest cause of childhood injury, fortunately they are rarely fatal, in contrast with a high rate of fall related mortality in adults and elderly people. Outcome mainly depends upon the height from which the child falls and nature of the surface onto which the child falls.

Conclusion

Fall from height comprise a leading cause of injury resulting in hospitalization and disability in children. Fortunately, this can be prevented or at least minimised by providing safe surroundings, close supervision of children and appropriate child safety education to the parents. Use of appropriate barriers to the rooftops, staircase, windows and educating the children about the safe playing measures will help in reducing the occurrence of accidental fall from heights. Anticipating the potential dangers and taking simple preventive measures will make the child safe from injuries due to fall and there by a disability free childhood and life.

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Sociodemographic study of acute barbiturates overdosed Egyptian patients admitted to poison control center of AIN Shams University hospitals during the year 2009

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Abstract

This work aims at the study of the socio demographic and drug history profile of acute barbiturates overdosed Egyptian Patients admitted to PCCA during the year 2009. Data on demographic and drug intake features were extracted from available patients' sheets and from the information unit Of PCCA. The socio-demographic profile showed that age group most affected was adolescents especially teenagers (60%). The majority of cases were males (89. %). Almost all subjects were single (98%) and 60.6% of them were from urban background. 88. % of subjects were unemployed, 81% of social class type (IV).. Conclusion : The results suggest evidence of socio-environmental factors correlated to barbiturates abuse. Recommendations : Nationwide continuous data collection and statistical analysis to detect changes in drug abuse modalities and publishing of these data for public beneficiaries the usual medical and law enforcement statistics are of little assistance in assessing the extent of non-medical use.

Introduction

The term 'barbiturate' generally refers to drugs which are derivatives of barbituric acid. Barbital, the first drug of this class to be synthesized, was introduced into medicine in Germany in 1903. Barbiturates rapidly gained a wide usage as tranquilizers, sedatives and hypnotics (sleep inducers) which continues to this day. In the past half-century, over 2,000 different barbiturates have been synthesized, although less than a dozen make up the bulk of current use. Among these are amobarbital (Amytal*), pentobarbital (Nembutal*), phenobarbital (Luminal*), and secobarbital (Seconal*). These drugs are frequently referred to as 'barbs', 'nemmies', 'goof balls', 'yellow jackets', 'red devils', 'do Barbiturates are among the most widely used psychoactive drugs (medically and non-medically) in our society, and are the toxic agents in thousands of accidental or intentional deaths annually in North America. In addition, the barbiturates have considerable potential for producing psychological and physiological dependence, and are probably second only to alcohol in frequency of drug-induced debilitation in modern society. While a considerable body of research exists into the many medical applications of these drugs, there has been relatively little careful investigation of non-medical use.

Aim of the work

The current study aimed at studying the Sociodemographic factors and drug history profile of all cases received to poison control center of Ain Shams University Hospitals by acute barbiturates overdose .The outcome of this work would help in recognizing the magnitude of the problem on statistical basis

subjects and methods

The current research is a retrospective study that carried on the information unite of PCCA . The following parameters were studied in all barbiturates overdosed patients admitted to PCCA during year 2009

Sociodemographic profile

Which include data about age, sex, residence, occupational status, martial status ,and social class .

(III) Statistical analysis

All parameters were written down in a specific spread sheets were analyzed and interpreted . Statistical analysis of data was done through IBM compatible personal computer using SPSS version 5.7 Echo Safe Corp .,USA (1997).

Results

Sociodemographic Profile

Discussion

Sociodemographic Profile

60% of the cases were in the age group less than 20 years old This could be attributed to the fact that this younger

Table 1: Age distribution among acute barbiturates overdosed Egyptian patients admitted to PCCA during year 2009.

Age In Years	Number Of Patients	Percentage
Less than 20 years	73	60%
20 – 40 years	42	34%
More than 40 years	7	6%
Total	122	100%



Table 2: Sex distribution among acute barbiturates overdosed Egyptian patients admitted to PCCA during year 2009.

Sex	Males		Females	
	Number	%	Number	%
89	72.9508	1967	33	27.04918033
Total	122			
Percentage	100%			

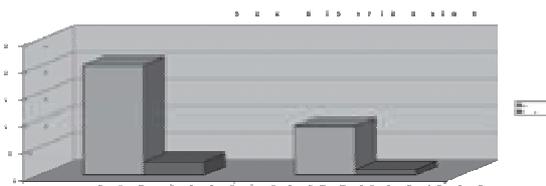


Table 3: Residence distribution among acute barbiturates overdosed Egyptian patients admitted to PCCA during year 2009.

Residence	Urban Area	Rural Area	Total
	60.66%	39.34%	100%



Table 4: Marital status among acute barbiturates overdosed Egyptian patients admitted to PCCA during year 2009.

Marital Status	Married	Single	Total
	2 %	98 %	100 %

Pie chart (3) showing that single or unmarried patient were the majority.

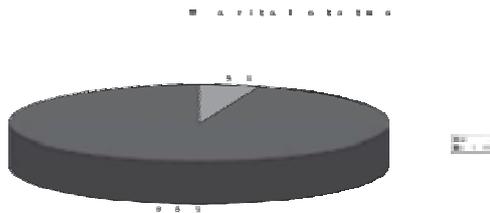


Table 5: Employment status among acute barbiturates overdosed Egyptian patient admitted to PCCA during year 2009

Employment Status	Percentage
Unemployed	88.2 %
Manual Workers	10.8 %
Official Jobs	1 %
Total	100 %

Pie chart (4) showing that majority of cases were unemployed

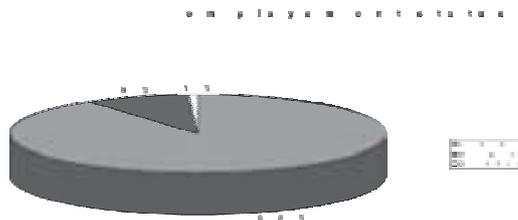
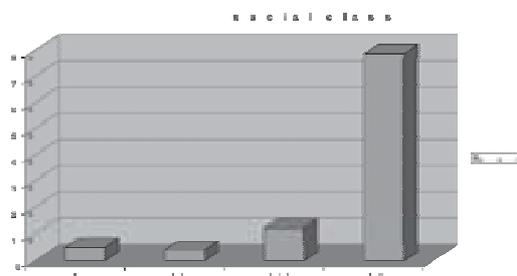


Table 6: Social class of acute barbiturates overdosed Egyptian patients admitted to PCCA during year 2009 .

Social Class	Percentage
I	4 %
II	4 %
III	11 %
IV	81%
Total	100 %



population has either the curiosity to try hard drugs such as opioid or the pressure of their peers and friends which played an important role . (<http://www.gdcada.org/statistics/teens.htm>)

89% of the subjects were males. This reflects the traditional background in the community. The males have the freedom to spend most of their times outdoors and can return home very late, also can make relationships with different individuals and peers of both sexes without any restrictions .

98% of cases were single, 88.2% were unemployed and 60.66% came from urban areas, and 81% were belonging to social class IV. This could be explained by; since almost all subjects were belonging to younger teenagers so most of them were unmarried and unemployed. Another explanation that poverty, ignorance, or leaving from education in schools and faculties besides poor economic standard of individuals in addition to migration from rural to urban areas (Urbanization), further complicate the problem of opiate abuse. This is well apparent in developing countries like Egypt (Saluja et al., 2008) . Low employment rates among drug abusers have been noted previously in Irish investigations (Carney et al., 1972; Kelly and Sammon, 1975) and also in surveys of British and American populations (Blumberg et al., 1974). The extent of employment varies from sample to sample. Carney et al. (1972) reported only 10% employment with his group of 50 Dublin drug abusers whereas Kelly and Sammon (1975), in a more extensive investigation, found that 58% of their subjects were employed either part-time or full-time. Estimates of employment rates within the British and American populations show similar variability.

Conclusion

The results suggest evidence of socio-environmental factors correlated to barbiturates abuse.

Recommendations

Nationwide continuous data collection and statistical analysis to detect changes in drug abuse modalities and publishing of these data for public beneficiaries as the usual medical and law enforcement statistics are of little assistance in assessing the extent of non-medical use.

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Clinical forensic medical consultations in an African population

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Abstract

Objectives

To document and analyze medico-legal cases that are non fatal and therefore non coroner seen in a Police medical centre.

Methods

This is a prospective study of all the medico-legal cases of non fatal nature seen in the Police medical centre, Benin-city between January 1st 2000 to December 31st 2000. Such cases were analyzed statistically with respect to age sex, category of case, time of occurrence of and occupation of victim.

Results

1051 non-fatal medico-legal cases were seen in the one year duration of the study. Victims were aged 1year-95years with a mean of 29.46years (S.D 13.65). The male: female ratio was 1.1:1. Children under 15years accounted for ---3.2% of cases. Students made up 47.9% of victims, while traders/businessmen, unemployed persons, professionals and artisans made up 18.3%, 17.7%, 9.1% and 7% respectively. Assaults made up 89.7% of the cases followed by sexual offences (8.1%), abortion (0.6 %) and road traffic injuries (0.6%).

Conclusion

The spectrum of clinical forensic medical cases seen in different parts of the world is similar. Public health measures are needed to reduce these cases which are known to be a drain on health resources.

Introduction

Despite the fact that forensic medical practice consists of four branches (medical jurisprudence, clinical forensic medicine, toxicology and forensic pathology)^{1,2} only forensic pathology is popular and practiced with some degree of expertise by hospital Pathologists in Nigeria. Cordner and his colleagues² had noted that clinical forensic medicine is an area of great diversity involving medical skills and specialties including those of hospital based disciplines, family medicine and general practice. It may also involve close liaison with groups in society unusual for medical practitioners. Whereas in advanced countries like USA and UK only specialist forensic Pathologists with requisite training and skills are allowed to function as forensic Pathologists, in Nigeria, the law allow any medical practitioner to carry out such forensic pathology duties³.

The scenario for the non-coroner medico-legal cases or clinical forensic medical cases is even more dismal. Many Pathologists do not dabble into this area, which has been left to general practitioners known as police doctors mainly in the general hospitals. This may be responsible for the dearth of research in this area of forensic medicine in Nigeria, a problem also highlighted in Australia².

Benin-city is the capital of Edo state in mid-western Nigeria with a relatively well educated populace by third world

standards. It has about four tertiary educational institutions, many secondary and primary schools and few industries. The incidence of clinical forensic medical consultations in this environment has not been previously documented. This study aims to form a data base for cases that may be seen by medical practitioners in this area, which are non fatal medico-legal cases and to compare the characteristics of such cases with similar cases from other areas. Reasons for similarities or difference will be proffered. It is also to suggest areas policy makers should pay attention to in developing measures to reduce these problems which are known to consume so much public health funds.⁴ Moreover, it is important to recognize areas to emphasize while teaching medical students forensic medicine in our schools.

Materials and method

All medico-legal cases of a non fatal nature seen in the Police medical centre, Benin-city between 1st January 2000-31st December 2000 were studied. Such patients are sent to the Police medical centre, Benin-city by the various Police Divisions in Benin-city investigating the cases. Data generated from each case include sex, age, occupation, nature of case, time of incidence, area and extent of injuries if any and number and sex of assailants if known. The data generated is set out in tables and analyzed statistically.

Results

In the one year duration of this study 1051 non fatal medicolegal cases were seen in the Police medical centre, Benin City. Five hundred and fifty three (52.5%) of these cases were males while 498 (46.5%) were females giving a male: female ratio of 1.1:1. The age ranged from 1year to 95 years with a mean age of 29.46 years (± 13.65). Table 1 shows the age and sex distribution of the clinical forensic medical cases seen. Children under 15 years of age accounted for 84 (8%) of such cases, with a male: female ratio of 1:3.7. There is a significant difference between sexes in the different age groups, especially in childhood, young adults and the middle aged ($\chi^2 0.01 = 11.34$, $\chi^2 = 31.85$).

Assaults accounted for 943 (89.7%) of the cases, sexual offences 85 (8.1%) abortion 9 (0.9%) and road traffic accident injuries 6 (0.6%) of the cases. Other cases seen were kidnapping (0.2%), missing male organ (0.2%) victim of armed robbery (0.2%), confirmation of pregnancy (0.1%) and a cases of a man who was confused after running into fraudsters. Table 2 shows the sex distribution of the various categories of medico-legal cases seen.

Table 3 shows the time of occurrence of the incidents when such times are known. Most sexual offence (30 out of 55 or

Table 1: Age and sex distribution of clinical forensic medical cases

Total	Female	Male	Total
Children	66	18	34
Young Adults	287	243	530
Middle Aged	186	224	410
Elderly	14	13	27
Total	553	498	1051

Table 2: Sex distribution of the various types of clinical forensic medical cases

Category	Female	Male	Total
Assault	456	487	943
Sexual Offences	85	0	85
Abortion	9	0	9
RTA	1	5	6
Robbery	1	1	2
Others	1	5	6
Total	553	498	1051

54.5% in which the times were known) occurred between the hours of 8pm and 7am, 18 (32.7%) took place during working hours of 7am and 4 pm. For the non sexual assaults, 484 out of 896 (54%) for which the times were known took place during working hours of 7 am and 4pm. There is a significant difference between time of occurrence of various categories of clinical forensic medical cases ($\chi^2 0.01 = 13.28$ $\chi^2_{cal} = 32.63$). Students made up 503 of the 1051 total cases seen (47.9%) while traders/businessmen made up 192 (18.3%). Unemployed persons and artisans made up 186 (17.7%) and 96 (9.1%) respectively while professionals accounted for 74 (7%). Victims of assault had an age range of 1 - 95 years with a mean age of 30.9 years (± 13.42). Students constituted 43.3% of the cases, 19.7% were traders/businessmen, while 19.6% were unemployed. Males made up 48.4% while 51.6% were females giving a male: female ratio of 1:1.1. The males were attacked by 446 males and 100 females while the females were attacked by 334 males and 223 females. In the cases in which the implements used for the attack were known, sharp objects were used in 206 of 984 objects used (20.9%), blunt objects used in 597(60.7%) and human bites in 164 (16.7%). Blunt objects included fists, kicks, head butting, clubs and rods. Sharp objects included matchets, knives and blades. These weapons caused injuries to the head and neck region in 607 (64.4%) of the cases, to the limbs in 478 (50.5%) of the cases and to the trunk in 264 (28%) of the cases. In many cases, multiple injuries resulted from the use of different weapons to various regions of the body. A total of 85 sexual offences were seen within the study period making up 8.1% of all cases seen. Victims of sexual offences, all females had an age range of 3 years – 25years with a mean age of 14.54 years (± 4.69). These victims were mainly pupils and students of various schools (95.3%). The age group 10 years – 24 years made up 81.2% of these cases. Children below the age of 15 years made up 56.5% of the cases seen. Of all the cases of sexual offences, the time of occurrence was known in 55 cases. Twenty two (40%) occurred between the hours of 20.00 hours and 24.00H 18 (32.7%) cases occurred within school hours. In 77 cases in which the number of assailants was known, 23 cases (29.9%) were by 2 or more assailants.

Discussion

It is generally believed in this environment that a forensic Pathologist's job is solely restricted to autopsy duties. During the one year period under review, the authors performed a total of 363 coroner autopsies in the major mortuaries in Benin City while the clinical forensic cases seen during this period were 1051. In Benin City, Nigeria, the state Government owned central Hospital, Benin City handles most medicolegal cases of non fatal nature. The cases making up this study is only a proportion of the total of such cases in Benin City. It can be seen therefore, that in a good set up, the forensic Pathologist

may see many more non fatal cases than the coroner cases. Amakiri⁵ studied forensic medical cases in rural Niger Delta area of Nigeria and found that similar cases are found both in rural and urban areas of Nigeria. This study included coroner and non coroner medico-legal cases, with clinical or non coroner medico-legal cases accounting for about 90.5 % of the total 375 cases seen in four general hospitals.

The age range of 1 year – 95 years seen in this study shows that clinical forensic medical cases cover many areas of medical practice including paediatrics and geriatrics. In childhood, there is a significantly more female involvement in these cases than male involvement. Deliberate policies aimed at protection of the girl child have to be put in place by government. The many protocols on protection of children, women and adolescents to which the government is a signatory have to be implemented^{6, 7, 8}. The preponderance of female children over male children in a ratio of 3.7: 1 is partly due to sexual assault on female children.

Injuries from interpersonal violence have been recognized as a significant public health problem the world over^{9,10,11}. The contribution of such cases to public health expenditure is becoming staggering prompting calls for preventive measures⁴. That cases of assaults make up a very large component of the cases in this study is not surprising. Amakiri⁵ had a similar finding in rural Niger Delta of Nigeria, where assaults from interpersonal violence made up the bulk (73.6%) of the cases seen. Benin City is on the fringes of the Niger Delta. People are generally more educated in Benin City than in most parts of Nigeria and are therefore more likely to fight for their perceived rights. The incidence of cultism in schools in this environment is also very high. Many of these assault cases may be cult related violence, although none of the assault victims confessed to involvement in cultism. Many such cases are settled out of court and this may embolden assailants to carry out further assaults in future.

Most of the clinical forensic medical cases seen involved students and took place during school and working hours. This suggests that many crimes are taking place in our schools these days. Since the take over of secondary schools from missionaries in the 70s, the level of morals in schools has been declining. This scenario has led to calls for the handover of such school to their previous owners (Christian missionaries) mainly in this environment for proper inculcation of morals in our students.

It is generally recognized that most sexual offences go unreported and unrecognized¹². The situation is not different in Nigeria where traditionally, a bride is expected to be chaste. Reasons that have been given for this under-reporting of sexual offences included social stigma, prejudice with regard to chances of marriage, being regarded as promiscuous and responsible for the incident, attendant humiliation and shame, embarrassment caused by appearance and cross examination in court, risk of losing respect and love of the society, friends and husband.^{12,13} In this study, however, sexual offences were the second most common cause of clinical forensic consultations with as many as 85 cases (8.1%) occurring in the 1year period under review. A previous study in the same Niger Delta zone of Nigeria recorded only 29 cases in 5years (yearly average of 6 cases).⁵ The reasons for this high incidence of reported sexual offences in this study are not clear but this may not be unconnected with the fear of being infected with HIV. Despite this apparent high level of sexual offences seen in this study, we still believe that the magnitude of this problem is much higher in this environment.

Table 3: Time of occurrence of incidents

Time (hrs)	0000 – 0659	0700 – 1159	1200 - 1559	1600 – 1959	2000 – 2400
Assault	75	325	159	197	140
Sexual Offences	8	6	2	7	22
Others	2	1	2	0	0

Other non coroner medico-legal cases seen by Amakiri⁵ and earlier noted by Cordner *et al*² included injuries from road traffic and other accidents, injuries from gun shots, non fatal abortions and other cases. The contribution of these cases to non coroner medico-legal consultations in this study is similarly low.

We concluded in this study that the spectrum of clinical forensic medical cases seen in different parts of the world is similar. With the almost equal distribution of these cases between males and females, we seem to be losing our traditional respect for women who are regarded as the weaker sex. Public health measures are needed to reduce these cases which are known to be a drain on health resource. More extensive studies are needed to ascertain the real magnitude of these cases.

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Correlation & pattern of ligature marks in cases of deaths due to hanging

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Abstract

This study was conducted between the year 2004-2005 to determine the pattern of ligature mark, and those factors that contributed for the formation of ligature mark over the neck and also to correlate the ligature mark with the manner of death. The sample for this study consisted of 80 cases of hanging which were reported during the year 2004 – 2005 along with detailed information regarding the deceased and the circumstances of death was collected from the police and relatives. Maximum number of suicidal hangings occurred in the age group of 20 to 29 years (mean=24.5). Numbers of hanging deaths in the men were more than the women.

Keywords

Hanging, Ligature mark, Asphyxial deaths, Ligature material, Unnatural deaths.

Introduction

A violent asphyxial death is one of the most important causes for unnatural deaths amongst which hanging and strangulation are commonly encountered in day to day autopsy.

Hanging is that form of asphyxia, which is caused by suspension of the body by a ligature around the neck, the constricting force being the weight of the body¹. Deaths resulting from hanging show features amongst which the ligature mark in the neck is considered to be decisive.

The ligature mark is a pressure abrasion on the neck at the site of the ligature which appears as a groove. Character of the ligature mark depends on various factors like the nature of the ligature, body weight, length of time the body has remained suspended and the number of turns of the ligature round the neck. The course of the ligature mark depends on whether a fixed or running noose has been used.

However variations in the ligature marks like faint/absent ligature mark, ligature mark artefacts (ex: ant bite marks) and other variables like a circular mark if the material is tied round the neck are encountered in day to day autopsies. Sometimes there may be double ligature marks. It may be due to slippage of the ligature. If the ligature is tied two or three times round the neck and then goes up to the knot, in addition to encircling marks, there is an inverted V shaped mark. This is confusing to those not familiar with the combination of such marks who may associate the lower (horizontal) marks with ligature strangulation and the upper one with hanging. The ligature mark may be faint if a soft material is used or if the ligature is cut immediately after the hanging.

It is easy to diagnose hanging when one finds the classical features. However all features are seldom present together. The application of pressure on the neck often results in findings, which are quite variable. Thus the ligature mark around the victim's neck constitutes an extremely precious piece of evidence to arrive at a conclusion as to cause of death and manner of death.²

Aims & objectives of the study

1. To study the pattern of ligature marks.

2. To study the factors that contributes for the formation of ligature marks.

3. To correlate the ligature mark with the manner of death.

Thus ligature mark/s, if can be the only finding to successfully distinguish a death resulting from hanging or otherwise, has been examined from medico-legal acumen.

Materials and methods

The present study was carried out in the Department of Forensic Medicine, M.S.Ramaiah Medical College and Hospital, Bangalore during the period of 2004 to 2005. A sum total of 80 cases were selected for this prospective study. Permission of the ethical committee on the use of human material for research purpose was obtained.

Detailed information regarding the deceased and the circumstances of death was collected from the police and relatives. In some of the instances, this information was supplemented by either, visit to scene of occurrence or from the photographs of scene of occurrence.

Inclusion criteria

All the cases brought with a history of hanging.

Exclusion criteria

Decomposed bodies where the ligature mark is masked.

The hanging victims were classified on various characteristics as follows:

A. Type of suspension:

1.Complete.

2.Partial.

B. Type of ligature mark produced:

1.Typical.

2.Atypical.

Observations made during the autopsy included external examination and internal examination of the deceased. The ligature material was studied, whenever the ligature material was in situ. The ligature materials were classified into two groups: Hard ligature materials and soft ligature materials. Ropes, metallic chains, etc were considered as hard. While saree, dupatta, lungi and towel etc were considered to be soft ligature materials.

External examination of the neck was conducted to study the ligature mark/s. Skin over the ligature mark was sent to department of Pathology at M.S.Ramaiah Medical College and Hospital for histopathological examination to note the nature of ligature mark as antemortem or postmortem.

Classification of ligature marks based on the topographical location of the highest level of the ligature mark is as below:

Level	I	=right front of neck.
	I,II	=below right ear.
	II	= right back of neck.
	II,III	=center of back (occipital, typical ligature mark)
	III	= left back of neck.
	III,IV	= below left ear.
	IV	=left front of neck.

Results and discussion

Age and Sex distribution in the study population.

It is observed from the above table that maximum number of hangings in the study population are seen in the age group 20-29 years (38%) followed by 10-19 years (25%) and 30-39 years (23%). In the sex distribution pattern males accounted for 47 cases (59%) as compared to 33 cases (41%) in females.

Table 1: Age

Sl. No	Age (years)	No. of cases	%
1	10-19	20	25
2	20-29	30	38
3	30-39	18	23
4	40-49	7	9
5	50-59	3	4
6	> 60	2	1
	Total	80	100

Table 2: Sex

Sl. No	Sex	No. of cases	%
1	Male	47	59
2	Female	33	41
	Total	80	100

The influencing factors for the above distribution being unemployment, love disappointment, marital disharmony, financial problems, dowry harassment etc.

Similar findings were observed in the studies conducted by B.K.Sen Gupta³, Gary. P. Paparo and Siegel.H⁴, Andrew Davison and Marshall T.K.⁵, Ryk James and Paul Sillocks⁶, A. Momonchand, Th.Meera Devi and L.Fimate⁷ G.A. Sunil Kumar Sharma,O.P.Murthy,T.D.Dogra⁸.

It is in contrast to the findings observed by James L. Luke,⁹ David A.L.L Bowen.¹⁰ For these studies were done in developed countries, where in there is ample employment opportunities, westernized culture and good governmental support programmes.

Distribution in the study population according to the type of hanging

(suspension and ligature mark)

In the present study it is observed that complete suspension were noted in 63 cases (79%) as compared to 17 cases (21%) of partial suspension.

Atypical ligature mark were noticed in 69 cases (86%) as compared to typical ligature mark in 11 cases (14%).The above

Table 3: Degree of Suspension

Sl. No	Degree of Suspension	No. of cases	%
1	Partial	17	21
2	Complete	63	79
	Total	80	100

Table 4: Ligature Mark

Sl. No	Ligature mark	No. of cases	%
1	Typical	11	14
2	Atypical	69	86
	Total	80	100

observations were similar to the findings observed by Andrew Davison and Marshall T.K.⁵Jorn Simonson,¹¹ Elfawal M.A, O.A. Awad,¹² Feigin Gerald,¹³.

The influencing factors being the majority of the study population were adult individuals who had committed suicides and hence more number of complete hanging. The position of the knot or any intervening object like clothings, bony projections (angle of the jaw), long plaits in Indian women and also the beard accounted for the majority of the mark being atypical.

It is in contrast to the findings observed by Gary P. Paparo,⁴ I. Morild,¹⁴ Jonathan P. Wyatt,Wyatt P.W.,Squires T.J.,Busuttill A¹⁵.BalabantarayJ.K.¹⁶ The reasons being that their study population was restricted to victims of lower age group, who had been either victims of accidental hanging or homicidal hanging.

Distribution in the study population with respect to the ligature material used

In the present study in 44 cases (55%) soft ligature material like lungi, duppatta, saree etc. were used and in 36 cases (45%) hard ligature material like nylon rope in 12 cases, electric cord in 3 cases, coir rope in 20 cases, plastic binder in 1 case.

TABLE 12: Ligature Materials Used

Sl. No	Materials used	No. of victims	%
1	Soft	44	55
2	Hard	36	45
	Total	80	100

Similar findings were observed in the studies conducted by G.A. Sunil Kumar Sharma,O.P.Murthy and T.D.Dogra⁸,Jitendra .K. Balabantaray,¹⁶ B.K. Sen Gupta.³ Because the suicidees uses readily and easily available ligature material.

It is in contrast to the findings observed by Jonathan P. wyatt, Wyatt P.W.,Squires T.J.,andBusuttill.A.¹⁵,Feigin Gerald,¹³ the reasons being usage of dogs lead, dressing gown cord, electric cable, suit case webbing, telephone cord, shoes strings, Bath robe belt etc. were used as ligature materials.

Distribution in the study population according to the position and type of the knot.

In the present study it is observed that in 23 cases (28%) the knot was in the right occipital region, in 19 cases (23%) it was below the right ear, in 18 cases (22%) it was in the left occipital region, in 14 cases (18%) occipital knot, in 5 cases (8%) below the left year and in 1 case (1%) below the chin.

Table 13: Position of the knot

Sl. No	Position of the Knot	No. of victims	%
1	Right occipital	23	28
2	Below the right ear	19	23
3	Left occipital	18	22
4	Occipital	14	18
5	Below the left ear	5	8
6	Below the chin	1	1
7	Others	0	0
	Total	80	100

Table 14: Type of Knot

Sl. No	Type of knot	No. of victims	%
1	Slipping	44	55
2	Fixed	36	45
	Total	80	100

Right and left and occipital positioning of knot were considered as posterior hangings, knot marks on the left and right anterior aspect of the neck below the ears were considered anterior hangings.

In 44 cases (55%) running noose with a slipping knot were used and fixed knot in 36 cases (45%). Similar findings were observed in the studies conducted by Nicolic Slobodan, Micic Jelena, Atanasijevic Tatjana, Djolic Vesna, Djonic Danijela¹⁷, Betz P. and Eisenmenger.w.¹⁸ Jorn Simonson,¹¹ Jitendra K. Balabantaray.¹⁶

Distribution in the study population with respect to the fracture of thyroid cartilage and hyoid bone.

In the present study it is observed that in 77 cases (97%) there was no fracture the thyroid cartilage and only in 3 cases (3%) there was a fracture of the superior horn on the left side

of the thyroid cartilage. The victims being in their 4th and 5th decades of life. the reasons being complete suspension of the

Table 15: Fracture of thyroid cartilage

Sl. No	Fracture of thyroid cartilage	No. of victims	%
1	Present	3	4
2	Absent	77	96
	Total	80	100

Table 16: Fracture of Hyoid bone

Sl. No	Fracture of Hyoid bone	No. of victims	%
1	Present	2	3
2	Absent	78	97
	Total	80	100

victim, ossification increasing with the age after 30 years, pressure over the horns exerted on to the spine because of greater traction.

Similar findings were observed in the studies done by Nikolic Slobodan, Micic Jelena, Atanasijevic Tatjana, Djokic Vesna, Djonic Danijela.¹⁷, Betz P. and Eisenmenger. S.¹⁸, Feigin Gerald,¹³ Jitendra Balabantaray.¹⁶ H. Green, James R.A., Gilbert J.D., and Byard R.W.¹⁹, Ryk James,⁶ Jorn Simonson,¹¹ Gary. P. Paparo.⁴

In the present study in 78 cases (98%) no fracture was detected and only in 2 cases (2%) showed fracture of the greater cornu on the right side of the hyoid bone. The age of the victim more than 60 years. The reason being the fracture increases with the age, seen commonly in typical and complete hanging, in cases of highest level of ligature mark on the back of the neck, increased duration of suspension and with a thin hard ligature material.

Similar findings were observed in the studies done by A. Momonchand, Th. Meera Devi and L. Fimate,⁷ Ryk James,⁶ C.B. Jani and B.D. Guptha,²⁰ M.P. Sarangi,²¹ Betz. P. and Eisenmenger. S.¹⁸, Nikolic Slobodan, Micic Jelena, Atanasijevic Tatjana, Djokic Vesna, Djonic Danijela.¹⁷, Feigin Gerald,¹³ I. Morid,²².

Conclusion

A study on Ligature mark in cases of hanging among autopsies conducted at M.S. Ramaiah Medical college, Bangalore between 2004 and 2005 April concludes as follows:

Characteristic features of the ligature mark observed were:

- Atypical ligature marks with complete hanging outnumbered typical ligature mark with partial hanging.
- Soft ligature materials were commonly employed with posterior knot positioning and the type of knot commonly employed being slipping knot.
- A distinct ligature mark furrow/groove of the width and pattern of the material used is observed in cases where a narrow and tough or hard ligature material is employed. Also in cases of complete hanging prominent ligature mark is observed. With softer and broader ligature materials a less distinct mark is observed.
- Features of antemortem hanging i.e. dribbling of saliva mark, Le facie sympathique were noticed externally and in some cases the skin with ligature mark was sent for histopathological examination however the results were not conclusive regarding the nature of the ligature mark as antemortem or postmortem.
- All the deaths due to hanging studied were concluded as suicidal in manner based on the history, circumstantial evidence, examination of ligature material, ligature mark characters like a single, interrupted, oblique mark above the level of thyroid cartilage with slipping of the ligature mark, periligature injuries and other internal findings on dissection of the neck tissues.

Limitations of the study

1. Study confined to a particular area.
2. Information regarding the deceased is based only on the history provided by police, relatives, panchanama, photograph of the scene of occurrence.

Recommendations

- ❖ In the present study, using the histopathological examination of the skin over the ligature mark to decide the antemortem or postmortem nature of the ligature mark was not of conclusive value. Hence this gives wide scope for other methods like enzyme histochemistry and other biochemical markers which could play a vital role in deciding the nature of the ligature mark as antemortem or postmortem. From the medico legal point of view, it is recommended that in cases of deaths due to hanging the following protocol is necessary:
- ❖ Photograph of the scene of occurrence should include point of suspension.
- ❖ In fatal cases not to disturb the ligature material and release only the suspension point or cut the ligature material away from the site of knot.
- ❖ To always bring the material along with the body for correlation with the mark.
- ❖ Radiograph of the neck plays a vital role to appreciate the fractures of hyoid bone and thyroid cartilage.
- ❖ If necessary to visit the scene of occurrence.

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Incest and rape by the father: A case report

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Abstract

In the present case a young lady aged about 17 years Intermediate passed student from Nandalur Kadapa (District) gave complaint in Nandalur P.S. in Cr.No. 26/2010 U/s 376 IPC against her father alleging that her own father committed rape on her and had sexual intercourse continuously since 5 years, due to threat and fear she accepted for sexual intercourse.

Keywords

Rape, Sexual Intercourse, Incest Consent IPC Section.

Introduction

Incest is the sexual intercourse by a man with a woman who is closely related to him by blood or by marriage i.e. within the forbidden degrees of relationship, for example a daughter, Grand daughter, Sister, step-Sister, Niece, aunt or Mother. Consent given by the woman is no defense in a case of incest and both man and the woman of and above the age of consent are punishable according to the law.

In India cases of incest do occur, but the police can not take cognizance of such cases, as incest for itself is not an offence, unless such sexual intercourse can be brought into any of the penalizing sections of the Indian Penal Code 1860, such as ss 376 and 497.

Incest most frequently occurs between members of nuclear family and the victims are most often children.

Between father and daughter

Electra complex – derived from the Greek myth of Electra Who wanted her brother avenge the death of their father by killing their mother

Between mother and son

Oedipus complex: named after the Greek mythical character Oedipus, who unknowingly kills his father and marries his mother.

Between brother and sister

Pharanoic incest: derived from the practice ancient Egypt in which myal brothers and sisters married each other

Case history

A 17 years old aged girl lodged a complaint in Nandalur P.S. in Cr. No. 26/2010 U/s 376 IPC on 03-07-2010 against her father, alleging that her own father committed rape and had sexual intercourse continuously since 5 years by putting her in threat and she accepted for sex.

She was examined by the Gynecologist RIMS hospital, Kadapa. On 04-07-2010 at 08:00 A.M. in the department of OBG

On Vaginal examination:

Hymen was not intact

Vagina admits three fingers.

Enlarged Breast nipple, Areolar colour changes. Collected vaginal swabs and washings and sent for the evidence of semen and spermatozoa.

Age estimation was conducted in the Department of Forensic Medicine & Toxicology on 04-07-2010 at 10:30 A.M. in the presence of WPC No: 2156

A.D.No: 22/2010 dated 04-07-2010.

Physical examination

Height of the Girl is 153 cm, Weight is 44 kg's, Chest circumference 73 cms, Abdomen circumference 65 cms.

Dental examination

(8)7654321	1234567(8)	
<hr/>		(8) = Not erupted
87654321	1234567(8)	

Total number of teeth 29 all are permanent

Radiological examination

1. X – Ray right elbow shows all centers are fused around elbow joint.
2. X – Ray right wrist joint shows lower end of radius and ulna in the final stage of fusion.
3. X – Ray Pelvis shows iliac crest and ischial tuberosity appeared and well developed but not fused

Opinion

Basing on Physical, Dental and Radiological examinations the individual person is aged about 17 years

Based on Gynecological examination and radiological examination the accused father was arrested and sent for remand.

Legal sections

Section 376 I.P.C Deals with punishment for rape

Section 327(2) Cr.Pc Enquiry or trail under section 376 IPC will be done in camera

Section 228 – A IPC Revealing the identity of a victim of rape is an offence.

Section 354 I.P.C Deals with indecent assault to outrage the modesty of girl

Section 497 I.P.C Is adultery

Discussion

Incest is the sexual intercourse by a man with a woman within prohibited blood relationship observing the legal and social customs. In India the incest cases are rare.

A case was brought to Modi in which the wife complained that her husband was having Sexual intercourse with his step daughter, but no was taken by the police as the act was done with the consent of the girl who happened to be above the age of consent.

Professor Bhooshan Rao has recorded 4 cases in two of which the father was concerned, in one father-in-law and in one a cousin.

Professor J.N.Sharma recorded a case in which it was

alleged that the father was having sexual intercourse with his adult daughter. The case did not proceed further as the daughter refused medical examination. In present case the daughter lodged a complaint in Nandalur P.S in Cr.No:26/2010 U/s 376 IPC against her father.

The accused father was arrested and sent for remand.

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Identificatin of sex and race from the adult clavicle in South India

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Abstract

Medico- legally it is a challenge to identify the clavicle if it is examined individually. Moreover Davangere comes under South India (South Karnataka) where majority of people belong to Dravidian race,⁵ their diet and environment certainly differs from the other states of the country.

The length, mid- Clavicular circumference, robust index, angles of curvatures of clavicle and weight is studied from Dept of Anatomy of J.J.M Medical College and S.S. Institute of Medical Science and Research Centre Davangere. A total no of 160 clavicles, 90 male (45 Right & 45 Left) and 70 Females (35 Right & 35 Left) are studied from different cadavers.

Attempt has been made by many workers to study the sex and race of clavicle. Jit & Singh (1966), Singh and Gangrade (1968). Arora et al (1978), Harbir Kaur (1989) Sayee R et al (1992). Present metrical study of clavicle is carried out to determine sex, race and to compare the observations with the other states where the majority of Aryan race is present with different diet and environment. Moreover many workers from other countries have also studied Clavicle. Their work is also compared with the present study.

In present study, it is observed that the length of the Clavicle is more on the Left side than that of right side in both sexes. 2) Degrees of Lateral angle is more on the on left side than the right side in both sexes. 3) Mid-Clavicular Circumference is more in male than females on both sides. 4) Weight of the clavicle is more in Males than Females on both sides.

Introduction

Sexual diamorphism or racial difference cannot be made until puberty. After puberty, generally female bones are lighter, shorter and smoother than male bones. The racial differences can be studied only by certain anthropological parameters.

When individual bone is brought before anatomists, anthropologists or medico-legal expert he certainly confuses to identify the sex. It is ridiculous but true that, a well known Medico-legal expert and anthropologist confused bears paw as human hand (Stedward. H, 1959). Microscopic study of bones also cannot justify any race or sex.

As clavicle is dermal bone its morphological, sexual diamorphism & racial aspect is not properly studied. Moreover clavicle does not represent any ventral arch⁶. From evolutionary point of view also, it is either absent or rudimentary in primates and lower animals or in some mammals it is straight, steeped or curved⁹ due to functional needs. Therefore the present study is undertaken to determine the sex and the race of the south Indian Clavicle.

Material and methods

90 Male (45 Rt & 45 Lt) and 70 Female (35Rt & 35 Lt) Clavicles from different cadavers available in Anatomy Dept of J.J.M Medical College and S.S. Institute of Medical Science and Research Centre Davangere were studied. The studied clavicles are non pathological, non-fractured and completely dried. The following parameters were studied :

1) Length of the clavicle measured by Vernier's Callipers

2) Mid-Clavicular Circumference: While taking the length of the clavicle the mid point was calculated and a mark was put with marking pencil at mid point of the clavicle. Then a graph strip was prepared as follows :

The thinnest strip was cut from a graph paper and numbered in millimeters. Each smallest column of graphs strip represented 1 millimeter. Then this strip was dipped in molten wax kept in thermostat at body temperature. This stiffened strip was wrapped around the midpoint of the clavicle to measure its circumference.

3) Measurements of angles is taken with the help of diaptograph for long bones. The tracings of contour of the clavicle were obtained on a sheet of plain paper with the help of diaptograph. For obtaining the contour of the clavicle. Each clavicle was placed on lump of plasticine in such a manner that its anterior and posterior borders were in the same horizontal plane. The mid points at sternal and acromial ends were on the contour of the clavicle were marked as point 'a' and 'b' respectively and were joined by a straight line 'ab'. Then central curved line of the clavicle was drawn as curved line exactly in the mid-way between anterior and posterior borders through out the length of the clavicle. Multiple points were taken in the centre of anteroposterior diameter at various levels. At least 15 points were taken in each contour. By joining all the central points a curve was prepared, the four points were taken as 'a' 'b' 'c' and 'd' on that curve.

'a' = the point in the middle of sternal end.

'b' = the point in the middle of acromial end.

'c' = the point on the curved line at the maximum concavity of the medial curve.

'd' = the point at the maximum concavity of the lateral curve.

The curved line has two convexities, the medial two-third is convex anteriorly, while lateral one-third is convex posteriorly. The deepest points on the curves of the clavicle, where the convexities were the maximum were marked by points 'c' and 'd' on each curve. Straight line is drawn to join 'a' and 'c', 'c' and 'd', 'd' and 'b'. The angle "acd" is the medial angle which is projecting forwards and represents the curvature of the medial two-third of the clavicle. The angle "cdb" is the lateral angle which is projecting backwards and represents the curvature of the lateral one-third of the clavicle.

These angles were measured in degrees with the help of a protractor.

4) Weight of the clavicle weighed in Analytical balance.

5) Robustness Index

Mid- Clavicular circumference x 100

Maximum length of the clavicle

6) Demarking points : Each parameter is calculated by using ± 3 SD value.

Observations

The length of the Male right Clavicle ranges from 123.60-166.29 mms (Mean 146.98) and Male Left Clavicular length ranges from 123.2- 169.93 mms (Mean 148.72). The length of female Right clavicle ranges from 113.26 – 155.3 mms (Mean 132.26) and female left clavicle ranges from 116.0 – 156.8 mms.(Mean 133.89)mms. Hence length of the male clavicle is significantly larger than female on both side.(table no 1)

If left female clavicle is smaller than 116.0 mm the sex cannot be identified and the length of right female clavicle is smaller than 113.26 mm sex can't be identified, similarly if Male left Clavicular length is less than 123.2 mm and right male Clavicular length is less than 123.6 mm sex cannot be identified.

Mid Clavicular circumferences observations are highly significant in male clavicle than in female due to the significance in Mid –Clavicular circumference (**table no2-3**) Robust Index which is calculated as

$$\text{Robust Index} = \frac{\text{Mid- Clavicular Circumference} \times 100}{\text{Maximum length of bone}}$$

also significant in Male clavicles of both sides. (**table no 4**) In the study of both the Medial and lateral angles, degrees of lateral angles is significant. On left side in both male and females. Male lateral angle ranges from 112 – 166.3^U (Mean 141) left female clavicles lateral angles ranges from 111 – 168^U (Mean 144.3) (**table 5,6 &7**)

Weight of the male right clavicle is 15.03 to 38.5 gms (Mean 25.43), whereas weight of the right female clavicle ranges from 8.39 – 38.5 gms (Mean 16.86) Left Male clavicle weight ranges from 14.8 – 36.6 (Mean 24.02) weight of Left female Clavicle ranges from 8.7 – 24.09 (Mean 16.4). (**table no- 8**). P values are highly significant in both sex on both sides.

In the racial differences, it is presumed that clavicles studied belong to Dravidian race⁽⁵⁾ and results are compared with northern Indians studies (Aryan race), white race, and Negro race. (**table no 9,10, &11**)

Discussion and Summary

Olive (1951) reported that Male Clavicular length of American Indians varies from 118.2 mm to 158 mm, hence Clavicular average length varies in different races and very widely separated races may have similar length. Jit and Singh (1966). Men have broader shoulders than women and therefore have longer clavicle. Krukierek (1951) believed that besides genetic factors, nutrition of the individual and other environmental factors influence the morphological and Metrical form of bones. Sing & Gangrade (1968) stated that, though general pattern of bones may be the same yet various morphological measurements may be found in different zones of the same country. Terry (1932) differentiated the Negro race from white race on the basis of Mid-Clavicular Circumference and Robust Index. Jit & Singh (1966) stated that there is no correlation between estimation of stature and length of clavicle of any individual. Steel (1966) explained that Mid- Clavicular circumference measurement is an ideal method for sexual dimorphism of Clavicle. Last R J (1991) wrote that normal or usual length of the clavicle is 14 cm, broader, in Male and more curved in female. Basmajian(1970) mentioned that right clavicle is shorter and stronger than left clavicle. Sayee R et al (1992) could analyse that Clavicular sex in 83.9 % Male and 87.3% Female accurately, by measuring Mid- Clavicular circumference, length and weight of the clavicle of Bangalore City. Bhasin M K (2006) stated that North India was occupied mainly by Aryan race and South India is occupied by Dravidian race excluding Metropolitan or cosmopolitan cities.

The present study shows that, though clavicle does not represent any mesodermal arch but the secondary cartilage of

Table 1: Measurements of the length of the clavicles in (mm).

Details of Measurements	Right		Left	
	Male	Female	Male	Female
Mean	146.98	132.26	148.72	133.89
SD	± 9.32	± 7.68	± 9.12	± 7.79
Range	123.6 - 166.29	113.26 - 155.3	123.2 - 169.3	116.0 - 156.8
Mean ± 3SD	119.02 - 174.94	109.2 - 155.3	121.36 - 169.2	110.52 - 157.26
Demarking point	>155.6	<119.10	>157.98	<120.46
% of Clavicle above demarking point	18	3	19	3
T- Value	15.77	17.22	13.95	18.11
S.E (Standard Error)	1.19	1		
'P' value	<0.001	<0.001		

P' values are highly significant in males than females on both sides

Table 2: Probable classification of sex of Clavicle on the basis of length alone

Length of Right Clavicle in both sex		
Sex	% of Misclassification	% of sexed correctly
Females	5.1	94.96
Male	16.7	83.5
Length of Left Clavicle in both sex		
Female	5.04	93.9
Male	18.9	81.1

Table 3: Measurements of Mid-Clavicular circumference in (mm) in both sexes

Sl No	Details of Measurements	Right Clavicle		Left Clavicle	
		Male	Female	Male	Female
1	Mean	37	31	36	30
2	S D	± 3.52	± 2.9	± 3.7	± 3
3	Range	28 - 46	25 - 41	36.5 - 47.9	24.9 - 42.5
4	Mean ± 3SD	26.3 - 47.38	22.8 - 40	26.8 - 47.9	21.8 - 39.78
5	Demarking Point	>40	<26	>40	<26
6	% of clavicle beyond Demarking Point	30.0	8	26.0	6.0
7	T- Value	10.51	10.68	9.72	10.0
8	S.E (Standard Error)	0.48	0.46		
9	'P' Value	<0.001		<0.001	

'P' values are highly significant in male clavicle on both side than female clavicle

the clavicle is the connective tissue that adapts to the prevailing environment and nutritional factors apart from genetic makeup. As it has to carry out dual functions. 1) Medial end acts as long bone and transmits body weight from arm to

sternum and vice versa. 2) Lateral end anchors the shoulder joint and facilitates the multiple movements, hence it assumes 'S' shaped structure. In primates clavicle is absent, rudimentary, or slightly curved but as when evolution proceeds from quadrupeds mammals to bipedalism the straight, rudimentary,

Table 4:
Statistical Study of Robustness Index

Sl No	Details of Measurements	45Male Pairs & 35 Female Pairs			
		Right Clavicle		Left Clavicle	
		Male	Female	Male	Female
1	Mean	25.83	23.13	25.00	23.00
2	S D	± 2.63	± 2.19	± 2.50	± 2.61
3	Range	18.3 – 30.8	18.09 – 29.05	17.5– 30.0	17.9 – 30.1
4	Mean ± 3SD	17.86 – 33.0	15.9 – 31.0	17.9 – 32.5	15.4 – 30.8
5	Demarking Point	>31.0	<17.9	>31.0	<17.9
6	% of Clavicle beyond Demarking Point	6	4	5	2
7	T- Value	9.82	10.56	10.00	8.81
8	S.E (Standard Error)	0.31		0.34	
9	'P' Value	<0.001		<0.001	

'P' values are highly significant in Male clavicle on both side than female clavicle

Table 5:
Measurements of Medial angle of Clavicle (in degrees)

Sl No	Particulars of Measurements	45Male Pairs & 35 Female Pairs			
		Right Clavicle		Left Clavicle	
		Male	Female	Male	Female
1	Mean	153.0	153.1	152.5	153.1
2	S D	± 6.1	± 5.4	± 5.8	± 5.3
3	Range	136 – 169	134 – 165	136 – 169	134 - 165
4	Mean ± 3SD	135.5 – 171.9	137.8 – 168.9	135.9 - 170	137.2 – 169.5
5	Demarking Point	>169.3	<135.8	>169.7	<135.9
6	% of Clavicle beyond Demarking Point		1.21		
7	T- Value	25.08	28.35	26.29	28.88
8	S.E (Standard Error)	0.96		0.83	
9	'P' Value	>0.05		>0.05	

'P' values are insignificant for both right and left clavicles in both Male & Females

Table 6:
Measurements of lateral angle of Clavicle (in degrees)

Sl No	Particulars of Measurements	45Male Pairs & 35 Female Pairs			
		Right Clavicle		Left Clavicle	
		Male	Female	Male	Female
1	Mean	141	142	141	144
2	S D	± 11.3	± 11.1	± 11.9	± 11.0
3	Range	114 – 163	106 – 167	112 – 166.3	111 - 168
4	Mean ± 3SD	109.6 – 173.1	109.3 – 175.6	106.3 – 176.8	111.7 – 178
5	Demarking Point	>175.9	< 109.3	> 177.6	< 106.4
6	% of Clavicle beyond Demarking Point	-	1	-	-
7	T- Value	12.47	12.79	11.84	13.09
8	S.E (Standard Error)	1.63		1.74	
9	'P' Value	> 0.05		< 0.05	

'P' value for both male & female for left clavicle is insignificant.

Table 7:
Analysis of the Index of curvature of both Clavicles (in degrees)

Sl No	Particulars of Measurements	45Male Pairs & 35 Female Pairs			
		Right Clavicle		Left Clavicle	
		Male	Female	Male	Female
1	Mean	294.1	293.2	294.2	297.3
2	S D	± 12.79	± 18.5	± 15.4	± 15.8
3	Range	267 – 322	262 – 326.8	260.58– 325.9	262.1 – 324.9
4	Mean ± 3SD	254.95 – 333	236.8 – 347.2	247.3 – 340	251 – 344
5	Demarking Point	>348.1	<255	>343.7	<247.2
6	% of Clavicle beyond Demarking Point	-	-	-	-
7	T- Value	22.99	15.84	19.10	18.81
8	S.E (Standard Error)	2.23		2.2	
9	'P' Value	>0.5		>0.5	

'P' values are insignificant in both sexes and both sides

Table 8:

Weight of the Clavicle of both Sexes (in grams)

45 Male Pairs & 35 Female Pairs

Sl No	Particulars of Measurements	Right Clavicle		Left Clavicle	
		Male	Female	Male	Female
1	Mean	25.43	16.86	24.02	16.4
2	S D	± 4.60	± 3.03	± 4.79	± 2.90
3	Range	15.03 – 38.5	8.39 – 23.98	14.8 – 36.6	8.7 – 24.09
4	Mean ± 3SD	11.35 – 40.01	7.74 – 26.05	10.58 – 40	7.59 – 25.75
5	Demarking Point	> 25	< 11.79	> 26	< 10
6	% of Clavicle beyond Demarking Point	41	03	45	2
7	T-Value	5.52	5.56	5.01	5.65
8	S.E (Standard Error)	0.45		0.58	
9	'P' Value	< 0.001		< 0.001	

'P' values are highly significant on both sides in males than female

Table 9: Comparison of Mean values of length of adult clavicles (in mm) in both sexes of different states of India and abroad

Workers	State	No of clavicle	Male right Length	Male left Length	Female Right Length	Female Left Length
Singh & Gangarde(1968)	UP(Banaras) Aryan Race	97 Pairs	141.49 ± 8.22	144.18 ± 8.01	125.78 ± 7.50	127.77 ± 8.10
Arora & etal(1978)	UP Agra Aryan Race	200 Male 100 Female	138.5 ± 10.77	139.32 ± 11.05	127.4 ± 6.8	127.2 ± 7.02
Singh 1996	Punjab Amritsar Aryan Race	236 Male 112 Female	145.58 ± 8.60	147.59 ± 9.25	130.36 ± 9.11	129.80 ± 1.77
Harbi Kaur 1989	Haryana Chandigarh Aryan Race	748 Male 252 Female	149.40 ± 8.91	151.14 ± 8.72	134.53 ± 9.68	136.21 ± 9.64
Sayee R etal 1992	Karnatak Bangalore Mixed Race	256 Male 256 Female	137 ± 9	141.15 ± 13	123.90 ± 8	128.20 ± 9
Parson 1916	England White Race	50 Pair Male 50 Pair Female	152	154	138	139
Terry 1932	USA White Race	Male 50 Pair	159.0 ± 0.88	154.1 ± 0.91	-	-
Terry 1932	USANegro Race	Male 50 Female 50	153.30 ± 0.83	155.86 ± 0.92	140.98 ± 0.76	141.78 ± 0.03
Oliver 1951	French White Race	110 Male 50 Female	154.20	155.00	137.90	138.70
Singh 1972	USA White Race	280 Pair	151.40	153.37	133.68	134.84
	USANegro Race	80 Pair	155.72	157.32	137.60	140.80
Present Study	South India Karnataka (Dravidian Race)	90 Male 70 Female	146.98 ± 9.32	148.72 ± 9.12	132.26 ± 7.68	133.89 ± 7.79

Table 10: Comparison of Mean value of Mid-Clavicular Circumference (in mm) in both sexes of different states of India and abroad

Workers	State	No of clavicle	Male right	Male left	Female Right	Female Left
Jit & Singh 1966	Punjab Amritsar Aryan Race	Male- 236 Female- 112	35.17 ± 3.17	35.70 ± 3.16	29.69 ± 1.74	29.51 ± 1.97
Singh & Gangarde(1968)	UP Banaras Aryan Race	97 Pair	35.09 ± 3.17	34.64 ± 3.17	28.52 ± 2.37	28.00 ± 2.22
Arora & etal 1978	UP Agra Aryan Race	200 Male 100 Female	32.85 ± 3.66	33.3 ± 3.79	28.15 ± 2.32	27.6 ± 2.52
Jit & Sahani 1983	Haryana Chandigarh Aryan Race	280 Male 80 Female	36.20 ± 3.50	35.90 ± 2.70	30.40 ± 2.70	30.00 ± 2.80
Habir Kaur 1989	Haryana Chandigarh Aryan Race	748 Male 252 Female	36.54 ± 3.31	35.54 ± 3.31	31.05 ± 2.52	30.87 ± 2.48
Sayee R etal 1992	Karnataka Bangalore City Mixed Race	256 Pair	37.00 ± 3.00	37.00 ± 3.00	32 ± 4.00	35 ± 4.00
Parson 1916	England White Race	Male 50 Female 50 Pairs	38.9	38.9	32.6	32.6
Terry 1932	USA White Race	Male 50	40.02 ± 0.36	38.58 ± 0.28	-	-
Oliver 1951	French White Race	100 Male 60 Female	39	37	32.4	31.4
Singh 1972	USA White Race	280 Pair	38.47	37.61	31.16	30.72
	USANegro Race	80 Pair	39.96	39.08	33.06	32.06
Present Study	South India Karnataka (Dravidian Race)	90 Male 70 Female	37.00 ± 3.52	36.00 ± 3.7	31.00 ± 2.9	30 ± 3.0

Table 11: Comparison of Mean value of Weight (in grams) of Clavicles in both sexes of different states of India and abroad

Workers	State	No of clavicle	Male right Weight	Male left Weight	Female Right Weight	Female Left Weight
Jit & Singh 1966	Punjab Amritsar Aryan Race	Male- 236 Female- 112	18.89	18.68	12.47	12.07
Singh & Gangarde (1968) b	UP Banaras Aryan Race	97 Pair	21.46	21.32	12.83	12.84
Arora & etal 1978	UP Agra Aryan Race	200 Male 100 Female	22.05	20.12	12.59	12.29
Jit & Sahani 1983	Haryana Chandigarh Aryan Race	280 Male 80 Female	25.78	25.34	17.55	17.21
Habir Kaur 1989	Punjab Chandigarh Aryan Race	748 Male 252 Female	23.18	22.77	16.38	16.11
Sayee R etal 1992	Karnataka Bangalore City Mixed Race	256 Pair	16.80	17.00	10.80	11.50
Oliver 1951	French White Race	110 Male 60 Female	26.10	25.50	17.10	16.20
Present	South India Karnataka	90 Male	25.43	24.02	16.86	16.4

Table 12: Comparative Study of Mean Value of Robustness Index (in mm) in both sex of different races.

Races	No of clavicles studied	Male right	Male left	Female right	Female left
White Race (Parson 1916)	50 Male 50 Female	25.60	26.20	23.90	23.40
White Race (USA) (Terry 1932)	50 Male	25.56 ± 2.21	25.16 ± 1.99	—	—
Negro Race (USA) (Terry 1932)	50 Male 50 Female	26.32 ± 2.17	25.40 ± 2.33	24.74 ± 2.74	24.29 ± 2.49
White Race (French) (Oliver 1951)	110 Male 60 Female	25.30	24.40	23.50	22.60
Aryan Race (Amritsar) (Jit & Singh 1966)	236 Male 112 Female	24.78 ± 2.08	24.24 ± 2.18	22.82 ± 1.60	22.76 ± 1.65
Aryan Race (Chandigarh) (Harbir Kaur 1989)	748 Male 252 Female	24.54 ± 2.48	23.78 ± 2.24	23.28 ± 2.49	23.69 ± 2.32
Dravidian Race (Present Study)	90 Male 70 Female	25.83 ± 2.63	25.00 ± 2.50	23.13 ± 2.19	23.00 ± 2.64

Table 13: Comparative Study of Degrees of Lateral Angle in different Races.

Races	Male Right	Male Left	Female Right	Female Left
White Race (Parson 1916)	147°	148°	150°	151°
White Race (Oliver. 1951)	141.80°	143°	145°	146°
Aryan Race (Harbir Kaur 1989)	143.27°	148.20°	144.65°	148.73°
Dravidian Race (Present Study 2010)	141°	141°	142°	144°

steps, acquires curved 'S' shape and adapted to prevailing regional factors.

The present study of mean value of length of the left clavicle is more than right clavicle in both sex (Table No.1). this study of length of clavicle agrees with the study of previous workers (Table 9) of India and abroad. The present study also similar with mixed race (studied by Sayee R etal 1992) and the Aryan races (Singh and Gangarde 1968), (Arora etal 1978), Harbir Kaur (1989), Singh (1996). The abroad study of length of clavicle also similar with present study also similar with present study (Parson 1916, Terry 1932, Oliver 1951, Singh 1972).

The average differences between the length of left clavicular mean value varies maximum 3 to 4 mm and minimum 2 to 1 mm in both sex and race.

The present study of Mid-Clavicular circumference is significant in male clavicle than female clavicle. The present study is also similar with the study of previous workers of India and abroad (Table 10). The significance ratio is smaller, that is 1 to 2mm including North Indian, White and Negro races also.

The present study of Robustness Index value is significant in Male clavicle than female clavicle, which is similar with the study of previous workers of India and abroad (Table 12). The

North Indian (Aryan race) mean values differs 2mm in both sex even in white and Negro races also the difference 2-3mm is observed in the male and female clavicle. That is male clavicular value is hardly 2 – 3mm more than female clavicle in the Robustness Index study.

The present study of lateral angle degrees partially agrees with the study of previous workers (Table 13) because in male clavicular lateral angle degree of both right and left remains same 41°- 41°. but the present study of female clavicle agrees with the study of previous workers. The North Indian (Aryan race) clavicle has 4°- 5° difference in both sex. White race has 1°- 2° difference in both sex.

The present study of weight of the clavicle in both sex is similar with the study of previous workers of India and abroad (Table 11). The study of weight of the clavicle has significant difference in both male and female clavicles but same sex of right and left clavicular weight differs hardly 1 – 2 gms in both sex.

Hence all available parameters has to be applied to justify sex and race because single parameter cannot justify the sex and race. As clavicle being a dermal bone its morphological values are uncertain due to adapting nature of the clavicle because adaptation is such a factor, even a medico-legal expert

can confuse bears paw as human hand²¹.

Conclusion

It is observed that :

- 1) Length of the clavicle is more on left than the right side in both sexes but significant in male clavicle.
- 2) of lateral angle are more on the left side than the right side in both sexes & significant on left side in both sexes.
- 3) Mid-Clavicular circumference is more in male clavicle than female on both sides & highly significant ..
- 4) Weight of the clavicle is more in male than females on both sides & difference is highly significant.

The present study shows that, these significant inferences will certainly help the anatomists, anthropologist and medico-legal expert to find out the sexual dimorphism, of clavicle and differentiate the south Indian (Mainly Dravidians)clavicle from north Indians (Aryan race).

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Gender differences in the pattern of organophosphorus poisoning in a Tribal district of Andhra Pradesh

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Abstract

Gender differences in the pattern of organophosphorus poisoning in a tribal district of Andhra Pradesh

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Objectives

Retrospective study for gender differences in the pattern of organophosphorus (OP) poisoning in Adilabad, a tribal district of Andhra Pradesh was carried out to know the present status.

Materials and methods

Data was collected from the records of OP poisoning patients admitted in RIMS Adilabad, a government medical college, for the period of 1st May 2005 to 30th April 2010. Gender differences were seen for death, hospital stay, time of consumption and age.

Results

70% males and 30% females were involved with peak cases during 2009-10. Death rate was 16 to 20% in male with majority of cases during monsoon season while in female it was less than 15% without seasonal variations. Mean hospital stay was almost similar in both genders. Time of consumption was evening and night hours in male and afternoon in female. Male from 3rd decade onwards and female in their 2nd and 3rd decade were commonly involved.

Conclusion

Better policies to reduce the impact of monsoon failure and overall development of female are needed.

Keywords

OP Poisoning, Suicide, Death

Introduction

It is well known from the time immemorial that human being always try and strive to get happiness in life. Many times we get it but sometime we don't, which leads to frustration in life. In frustration some persons try to do self harm by using diverse variety of methods depending upon various factors like urban or rural nature of the region, availability of the methods and their lethality etc. Amongst various methods which are used by them, poisoning is one of the leading causes of morbidity and mortality worldwide.¹In developed countries

deaths due to pesticide are rare because of easy availability of treatment. But in developing countries it is one of the leading cause² with an estimated 30,00,00 deaths per year.³ Organophosphorus poisoning is also a significant problem in India and causes many deaths in central and south India.⁴

Andhra Pradesh, a south Indian state has highest rate of agricultural pesticide poisoning in India.⁵ Adilabad is a tribal district of Telangana region of Andhra Pradesh with substantial tribal population. Rajiv Gandhi Institute of Medical Sciences (RIMS) Adilabad is a referral centre but few cases are also referred to the nearby districts hospital because it is one of the biggest districts and bordering villages/towns are far away. It has some urban towns but 73.52% population lives in tribal and rural regions and 68.97% population is engaged in agriculture. The leading crop of the region is cotton with 31% share in total swing area of the district which depends mainly on monsoon although some portions of the district have better irrigation facilities.⁶

The present study was carried out in RIMS Adilabad, the only medical college of the district, to determine the gender difference in the pattern of OP poisoning and its outcome as it is important to know the magnitude of the problem so as to initiate suitable policies for prevention of the problem. Furthermore there is dearth of knowledge regarding pattern of OP poisoning in this tribal district.

Material and methods

Present study was carried out retrospectively from May 2005 to April 2010 in RIMS Adilabad. Data was collected from the case sheets of patients of RIMS Adilabad from the record section. Only patients who were hospitalized for OP poisoning were included in the study. Patients were diagnosed as a case of OP poisoning by casualty medical officer and duty medical officer of RIMS Adilabad. Diagnosis was based on the history by the victim or attendants along with clinical features. These patients were treated with pralidoxime and atropine. Gender differences were seen for, age, time of consumption, duration of hospital stay and deaths. Data was analysed for descriptive statistics and p value using prism software, version 5.03 (trial). Approval for the study was granted by institutional authorities.

Results

During the five years study period 1301 patients were admitted in RIMS Adilabad with OP poisoning. In them 909 were male and 392 were female, male to female ratio was 2.3:1. The difference between number of male and female was statistically significant ($p < 0.05$). Major increase in the incidence of OP poisoning was seen from 2007-2008 (21.60%) with peak cases in 2009-2010 (28.21%). In male and female trend was similar with peak during 2009-2010 (19.98%) and 8.22% respectively. Table-1

Seasonal variations were observed in male OP poisoning cases. Incidence increased from the month of June (6.38%) with peak during September (9.07%) and lowest during May (3.23%). In female there was no seasonal variation but peak cases were seen during April (3.92%) and lowest in June (1.61%). Fig. 1.

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Table 1: Distribution of OP poisoning cases
n=1301

Year	Male		Female		All OP Cases	
	No.	%	No.	%	No.	%
2005-06	151	11.61	51	3.92	202	15.53
2006-07	115	8.84	70	5.38	185	14.22
2007-08	196	15.07	85	6.53	281	21.60
2008-09	187	14.37	79	6.07	266	20.45
2009-10	260	19.98	107	8.22	367	28.21
Total	909	69.87	392	30.13	1301	100

Table 2: OP poisoning deaths
n= 1301, Deaths=208

Years	Male			Female		
	No.	%	Rate	No.	%	Rate
2005-06	25	12.02	16.56	5	2.40	9.80
2006-07	23	11.06	20.00	10	4.81	14.29
2007-08	38	18.27	19.39	10	4.81	11.76
2008-09	36	17.31	19.25	10	4.81	12.66
2009-10	42	20.19	16.15	9	4.33	8.41

Fig. 1: Seasonal variations in OP poisoning
n = 1301

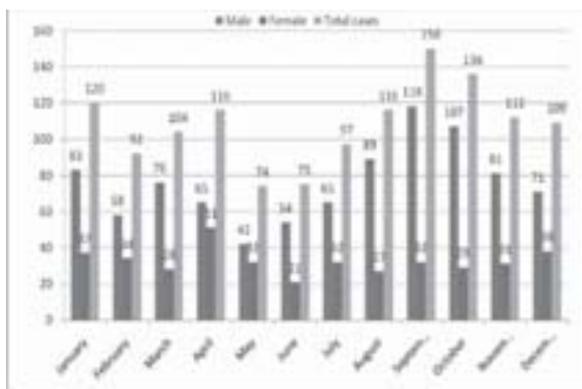
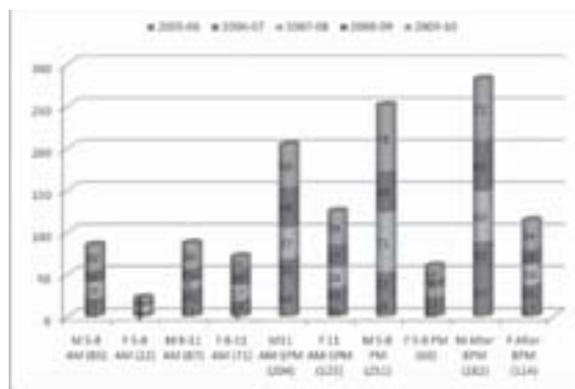


Fig. 2: Consumption time wise distribution



In OP poisoning deaths, male outnumbered female ($p < 0.05$) with 164 male (mean=32.8, median=36) and 44 female (mean=8.8, median=10). Peak male deaths were observed during 2009-2010 (20.19%) while least in 2006-2007 (11.06%). In female lowest number of deaths recorded during 2005-2006 (2.40%) while all other years recorded almost similar number of deaths (from 4.33% to 4.81%). In male rise in deaths from 2006-07 was observed as number of OP cases increased. But in female, it was not seen and even fall was observed in 2009-10 (4.33%) although the number of OP cases in all those years increased. Death rate in male was in between 16% to 20% while in female it was always below the level of 15%. Table 1&2.

Male deaths were more during the season of July to December which was significantly higher than January–June season. Peak number of deaths observed was during the months of August and September (24 each). In female there was no major difference between both the seasons. Table 3

Total duration of hospital stay for all OP cases collectively was 4919 days. Male patients admitted for 3417 days and female for 1502 days. In male, mean duration of hospital stay was 3.76 days while in female it was 3.83. Table 4

Male consumed OP compounds most frequently after 8 PM (21.68%) in the night followed by 5 PM to 8 PM (19.29%), 11 AM to 5 PM (15.68%), 8 AM to 11 AM (6.69%) and frequency of OP poisoning was least in the morning hours of 5 AM to 8 AM (6.53%). In female, majority of cases consumed OP poison during 11 AM to 5 PM (31.89%) followed by after 8 PM (29.08%), 8 AM to 11 AM (18.11%), and 5 PM to 8PM

(15.31%) and least during 5 AM to 8 AM (5.61%). **Figure No-2.**

Males in their 3rd decade of life were the most common victims of OP poisoning (310) followed by 5th decade (253), 4th decade (225) and least in 2nd decade (121). In female 3rd decade (192) was most common followed by 2nd decade (129), 4th decade (41) and least in 5th decade (30). Fig. 3.

Discussion

From all OP poisoning cases almost 70% male and 30% female consumed OP compounds indicating male

Fig. 3: Age wise distribution

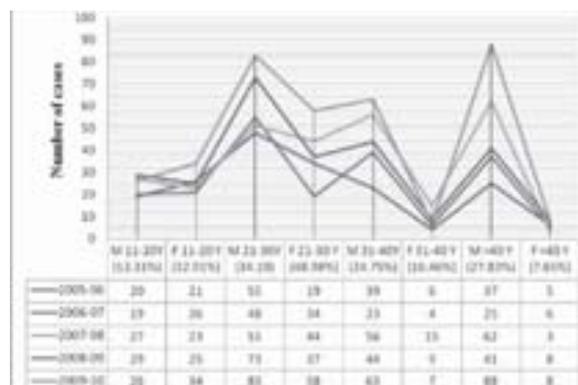


Table 3: Seasonal variations in deaths
Deaths=208

Months of Study Period	Male		Female	
	No.	%	No.	%
January	13	6.25%	5	2.40%
February	7	3.37%	1	0.48%
March	18	8.65%	4	1.92%
April	14	6.73%	2	0.96%
May	7	3.37%	3	1.44%
June	8	3.85%	5	2.40%
Total	67	32.22%	20	9.60%
July	5	2.40%	3	1.44%
August	24	11.54%	5	2.40%
September	24	11.54%	1	0.48%
October	11	5.29%	7	3.37%
November	17	8.17%	7	3.37%
December	16	7.69%	1	0.48%
Total	97	46.63%	24	11.54%

Table 4: Hospital stay in days

Year	Male		Female	
	Cases	Duration	Cases	Duration
2005-06	151	493	51	158
2006-07	115	363	70	258
2007-08	196	787	85	372
2008-09	187	770	79	334
2009-10	260	1004	107	380
Total	909	3417	392	1502

predominance. Other studies also indicate male predominance.^{7,8} In the study of Dash et al 80% cases belongs to rural region with male predominance⁷ while in the study of Kiran et al which was conducted in urban region male to female poisoning ratio was 1.7:1.⁸ High incidence in male in the tribal district indicates that male of the region are also suffering from the same level of stress which is responsible for suicidal intake of OP compounds by the other non-tribal district males. As males are usually exposed to more multiple type of stress in comparison to females,⁴ hence they are more prone to take OP compounds. The pattern also indicates that males of the tribal district are also getting involved in lifestyle like other rural population of India. Trend of OP poisoning is much lesser in female, indicating the tribal district female still lack substantial progress in various fields in comparison to their male counterpart and is less exposed to different factors of life, like modern life style, stress, family and social problems. Because these factors can trigger more misuse of OP compounds.⁹

High incidence of male OP poisoning during monsoon season indicates tremendous impact of crop loss on regional social life. Because majority of the population (68.97%) is involved in agriculture practice and one of the major crop is cotton which depends mainly on monsoon.⁶ Failure or late arrival of monsoon or inadequate rain is responsible for damage to crops leading to heavy financial losses. Gautami et al also observed similar trend of overall poisoning cases in nearby districts⁵ and other part of rural India by Batra et al.⁴ There were no specific seasonal variations in female. It indicates that female of the region are not the heads of the family and they are not involved in running the financial aspects of the family leading to less direct impact of monsoon failure or loss in business.

Trend of OP poisoning deaths in male corresponds to incidence of OP poisoning in them. It indicates that the severity of OP compounds consumption remained same. It also shows that there were no drastic changes in the manner of management of OP poisoning in the hospital. Other factors like time to reach the hospital, transporting system and infrastructures facilities are also not substantially improved leading to increase in the deaths each year. Srinivas et al¹⁰ also

indicated that delay in hospital admission increases the probability of death. Seasonal variations of deaths in male again highlight the importance of monsoon while its negligible impact on female is also evident by the study.

Deaths in females were almost static, even fall was seen during 2009-10. Probably female of the tribal district may have less knowledge about the lethal potential and might ingest in inadequate quantity. Moreover, intention of OP poisoning may not be suicide, it may be attempt or to just produce less intense self harm. There may be various other reasons, which are common in other regions like to seek revenge or attention, express distress¹¹ or acute relationship crisis.¹² In the present study we cannot say precisely about the magnitude of the above mentioned problems.

Duration of hospital stay was almost similar in both genders. It shows that family members/close relatives of the patients do not differentiate on the basis of gender and give due attention to them because they are mainly responsible for financial aspect and hospitality of the victims during the hospital stay. Mean hospital stay was more in the study of Dash et al (5.1 days)⁷ and Kiran et al (6.85 days).⁸ It may be because of our study was conducted in tribal district hospital with limited healthcare facilities.

In the present study, male consumed OP compounds most frequently during night and evening hours while female in afternoon. Similar trend was observed by Kanchan et al.¹ While Dash et al reported one-third cases in later part of the day.⁷ Corticoids are secreted mainly during few morning hours.¹³ Corticoids prepare the body to resist effects of all kind of stress. It is one of the probable reasons why there is least number of OP poisoning cases during morning hours in both sexes. In the evening and night, corticoids levels are less. Although stress increases corticoids level but may not reach the same level which can be induced during morning hours with same kind of stress. It may be the possible explanation of high number of male OP poisoning cases during evening and night hours. If female have reasons to produce self harm then they take extreme steps during afternoon hours because they are alone in their homes and usually nothing is there to divert them from stressful situation.

Our study indicates that most of the poisoning occurred during the 3rd decade of life in both sexes which is in agreement with the study of Dash et al⁷ and Kanchan et al.¹ Almost 82% cases in female were in between 11 to 30 years age group while in male more than 86% cases were beyond the age of 20 years. Joseph et al also found higher rate of suicide in rural female of 15-24 years of age than their male counterpart.¹⁴ Probably female of this tribal district also have the same kind of stress which are typically associated with 2nd and 3rd decade of life like conflict with parents, unsuccessful love affairs and marriage related problems etc promoting them to take extreme steps. Males from 3rd decade of life are physically, mentally and socially more active and traditionally have lot of responsibilities towards family and society. Hence failure of monsoon, loss in business or pressure from money lenders can also compel male of this age group to take extreme steps in this tribal district.

Conclusion

This study differs from most of other studies in one important aspect that female are involved in much lesser number and death rate is still less. There is urgent need of initiation of better social welfare schemes in the district to reduce the impact of monsoon failure. More and better schemes for overall development of female in various fields are needed. Substantial improvement in the infrastructure and OP poisoning management is also required.

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Effect of low-level environmental lead exposure on the intellectual functions of children of El-Minia city, El-Minia governorate, Egypt

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Abstract

Lead (Pb) is a confirmed neurotoxin. Clear adverse effects of blood Pb level (BLL) $\leq 10 \mu\text{g/dl}$ have been documented in children, but questions remain about Pb-associated intellectual disorders at these BLL and whether lower exposures are associated with greater disorders.

Objectives

To study the intellectual functions associated with environmental low-level Pb exposure in children of the villages of the east coast of the River Nile of El-Minia city that located nearby El-Minia industrial area.

Subjects

This study was conducted at Suzan Mubarak Hospital, El-Minia University during the period from 1st August, 2007 to the 31st of July, 2009. It included 120 children aged 7-9 from the nearest 2 villages to El-Minia industrial area (60 children each) namely, El-Newayrat and Al-Shorafaa, and 60 children from Talla, a village located to the west of El-Minia city far away from El-Minia industrial area, as a control group.

Methods

For all patients, BLL had been estimated, and intellectual functions has been evaluated using Wechsler's Intelligence Scale for Children, 3rd ed.

Results

BLL of children of El-Newayrat and Al-Shorafaa were significantly increased when compared to that of Talla children with higher affection reported with El-Newayrat. The outcome of Wechsler's Intelligence Scale revealed a significant reduction of verbal, performance and full scale IQs in El-Newayrat and Al-Shorafaa when compared to Talla with higher affection reported with El-Newayrat, with a strong negative correlation to BLL of 5-10 $\mu\text{g/dl}$. It could not be estimated that every 1 $\mu\text{g/dl}$ increase in BLL was accompanied by a fixed lowered score. There was no statistically significant difference between males and females regarding the BLL and Wechsler's Intelligence Scale scores.

Conclusion

Low-level Pb exposure in children of the villages of the east coast of the River Nile of in El-Minia city that located nearby El-Minia industrial area was accompanied with intellectual function impairment which is not associated with sex and reported to be nonlinear relationship. It is advised to perform a national study to evaluate how big is the problem and to put Pb-toxicity in the list of the national health problems.

Keywords

Lead, Children, Intellectual functions, Environmental toxicity.

Introduction

Lead is an important toxicant that can exert adverse effects in humans. Systems known to be susceptible to adverse effects of high exposure include neurological, reproductive, renal, and hematological. Children are more sensitive than adults to the effects of Pb, and precautions should be taken to limit childhood exposure and keep BLL below the Centers for Disease Control and Prevention's level (CDC)-recommended level of 10 $\mu\text{g/dl}$ (Juberg, 2000).

Lead is a confirmed neurotoxin, but questions remain about Pb-associated intellectual deficits at BLL $< 10 \mu\text{g/dl}$ and whether lower exposures are associated with greater deficits (Lanphear et al., 2005).

Few studies provide data directly relevant to the question of whether BLL $< 10 \mu\text{g/dl}$ adversely affects children's cognitive function (Jusko et al., 2008). This study focused on the intellectual function disorders associated with environmental low-level Pb exposure in children of the villages of the East coast of the River Nile of El-Minia city that located nearby El-Minia industrial area.

Subjects and methods

Subjects

The current study was conducted at Suzan Mubarak Hospital, El-Minia University during the period from 1st of August, 2007 to the 31st of July, 2009. It included 120 children aged 7-9 years from the nearest 2 villages to El-Minia industrial area (60 children each), namely, El-Newayrat (34 males and 26 females) (500 meters from the industrial area) and Al-Shorafaa (31 males and 29 females) (10 km from the industrial area), and 60 children from Talla (36 males and 24 females), a village located to the West of El-Minia city far away from El-Minia industrial area, as a control group. The study was explained to the relative(s) and their verbal consents were obtained before performing any step. From 754 children seen at this period from the mentioned villages, only 207 ones' relatives agreed to participate in this study. We excluded from this study children with BLL $\leq 10 \mu\text{g/dl}$., children with mental retardation (MR) or family history of MR, abnormal neurological disorders and/or systemic or debilitating diseases e.g., malnutrition, diabetes mellitus, ... etc.

Methods

Assessment of intellectual functions was conducted using Wechsler's Intelligence Scale for Children, 3rd ed. (Wechsler, 1995).

BLL was measured using automated drug monitoring system in El-Minia University Poisoning Control Center (PCC) (EXPRESS PLUS, Chiron-Diagnostics USA).

Statistical analysis

Data were checked, coded, entered and analyzed using SPSS (version 17.0 software). The results were expressed as means \pm S.D. Comparisons were done using the unpaired

Student's t-test and one-way ANOVA test and LSD-test, with statistical significance assured at $p < 0.05$.

Results

Results of the current study revealed that BLL of children of El-Newayrat and Al-Shorafaa were significantly increased ($6.38 + 1.32$ and $3.84 + 0.79$, respectively) when compared to that of Talla children ($1.85 + 0.72$) with higher affection reported in El-Newayrat (Table 1).

Regarding the outcome of Wechsler's Intelligence Scale Scores when correlated to BLL, one-way ANOVA test revealed that there were a significant negative correlations between BLL and both of verbal, performance IQ, and full scale IQ values in all children of El-Newayrat, Al-Shorafaa and Talla (Table 2 & Fig. 1-3).

LSD-test was performed and revealed that verbal, performance and full scale IQs were reduced in El-Newayrat and Al-Shorafaa significantly when compared to Talla with higher affection reported in El-Newayrat. Also, there was a strong significant negative correlation between BLL of 5-10 $\mu\text{g/dl}$ and IQ values, but it could not be estimated that every 1 $\mu\text{g/dl}$ increase of BLL was accompanied by a fixed lowered score

which indicates a nonlinear relationship. (Tables 3-4 & Fig. 1-3).

There was no statistically significant difference between males and females regarding the BLL and Wechsler's Intelligence Scale Scores in all investigated children (Table 5).

Discussion

Clear adverse effects of BLL $> 10 \mu\text{g/dl}$ have been documented in children (Surkan et al., 2007). Few studies provide data directly relevant to the question of whether $\text{BLL} < 10 \mu\text{g/dl}$ adversely affect children's cognitive function (Jusko et al., 2008).

From the 1980s many well-designed epidemiological studies have confirmed that low-level, subclinical Pb exposure in early life is associated with decrements in children's intelligence. Neurodevelopmental deficits from exposure to a low level of Pb have been held to be a worldwide issue in the past decade (Koike, 1997).

Despite dramatic declines in children's BLL and a CDC of concern to 10 $\mu\text{g/dl}$ (0.483 mmol/L), little is known about children's neuro-behavioral functions at lead concentrations below this level (Canfield et al., 2003). Increasing evidence

Table 1: Blood lead level and Wechsler's Intelligence Scale Scores (Mean + SD and range).

Parameter	El-Newayrat(No.60)			Al-Shorafaa(No.60)			Talla(No.60)		
	Mean	SD	Range	Mean	SD	Range	Mean	SD	Range
Lead	6.38	1.32	4.01-8.62	3.84	0.79	2.31-5.30	1.85	0.72	0.91-3.36
Ver. IQ	80.63	11.39	56-96	86.58	12.60	60-102	91.53	12.6	62-106
Perf. IQ	79.35	11.92	55-94	87.53	13.77	60-104	90.25	11.9	63-104
F.S. IQ	84.60	13.62	58-100	82.18	11.55	56-99	89.73	14.1	61-107

Ver. IQ: Verbal IQ, Perf. IQ: Performance IQ, F. S. IQ: Full Scale IQ, *: Statistically significant

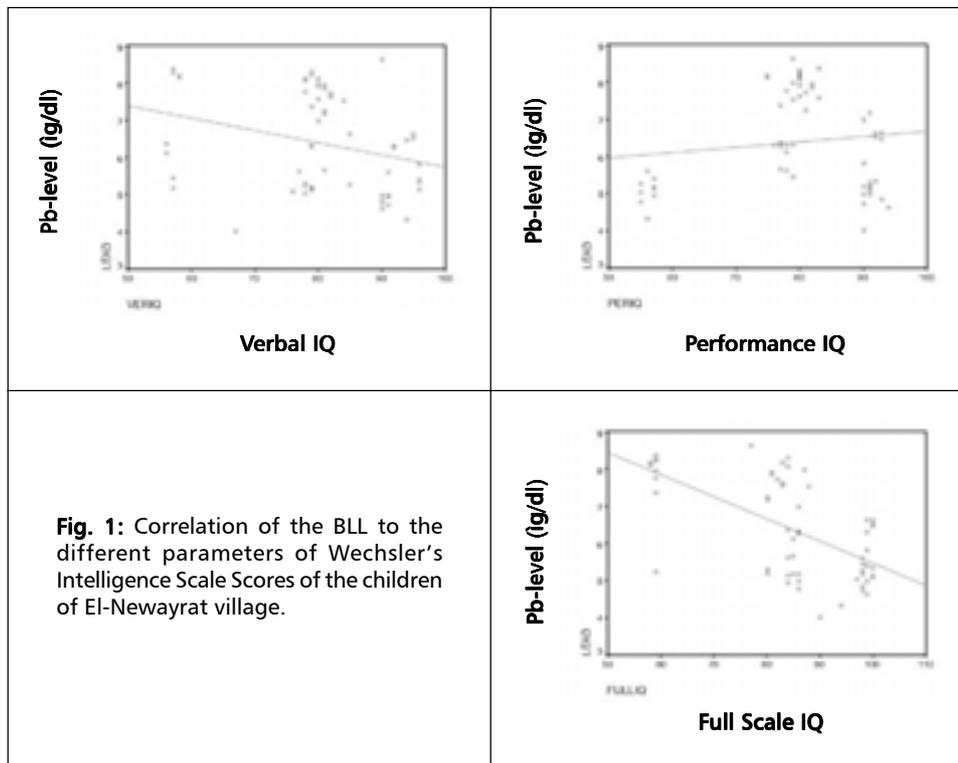


Table 2: Correlation between the BLL and the outcome of Wechsler's Intelligence Scale Scores (One-way ANOVA test)

Parameter	Blood Lead Level							
	El-Newayrat (No.60)		Al-Shorafaa (No.60)		Talla (No.60)		All	
	r-value	P-value	r-value	P-value	r-value	P-value	r-value	P-value
Ver. IQ	- 0.591	0.000**	- 0.374	0.000**	- 0.411	0.000**	- 0.419	0.000**
Per. IQ	- 0.480	0.000**	- 0.395	0.000**	- 0.323	0.000**	- 0.364	0.000**
F. S. IQ	- 0.402	0.000**	- 0.513	0.000**	- 0.394	0.000**	- 0.330	0.000**

Ver. IQ: Verbal IQ, Per. IQ: Performance IQ, F. S. IQ: Full Scale IQ, *: Statistically significant

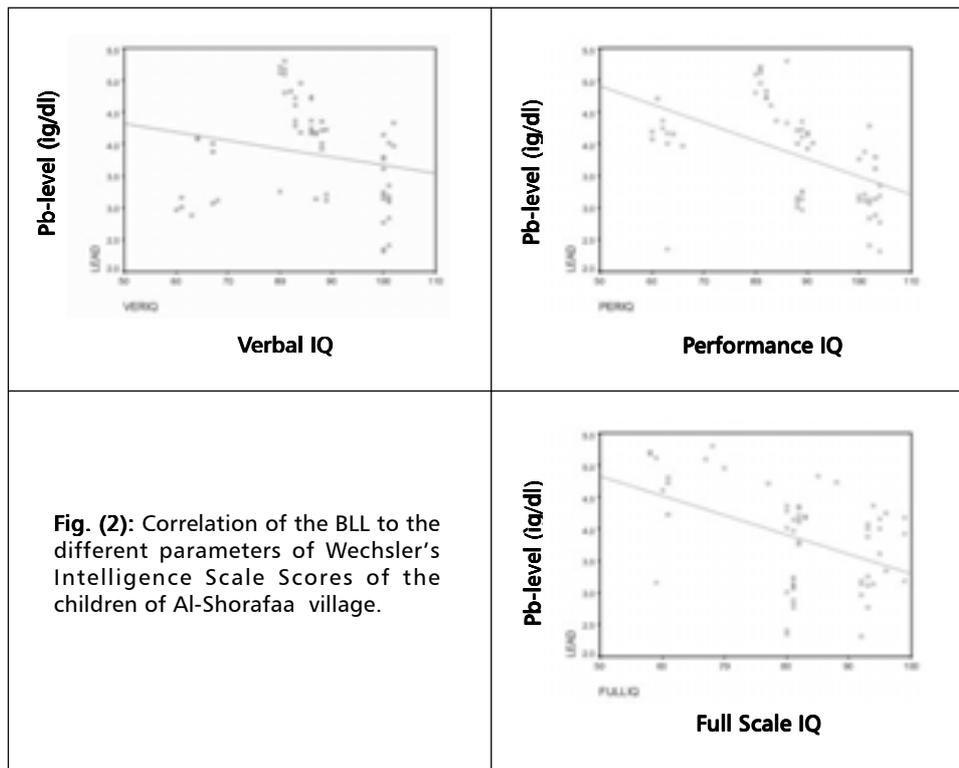


Table 3: Correlation of the BLL to the different parameters of Wechsler's Intelligence Scale Scores of the different investigated villages (LSD-test).

Parameter	Group	Group			
		Al-Shorafaa		Talla	
	r-value	P-value	r-value	P-value	
Lead	El-Newayrat Al-Shorafaa	2.54	0.000**	4.531.99	0.000**0.000**
Verbal IQ	El-Newayrat Al-Shorafaa	6.11	0.000**	11.064.95	0.000**0.000**
Performanc IQ	El-Newayrat Al-Shorafaa	8.16	0.000**	10.882.72	0.000**0.000**
Full Scale IQ	El-Newayrat Al-Shorafaa	2.42	0.001**	5.137.55	0.000**0.000**

*: Statistically significant

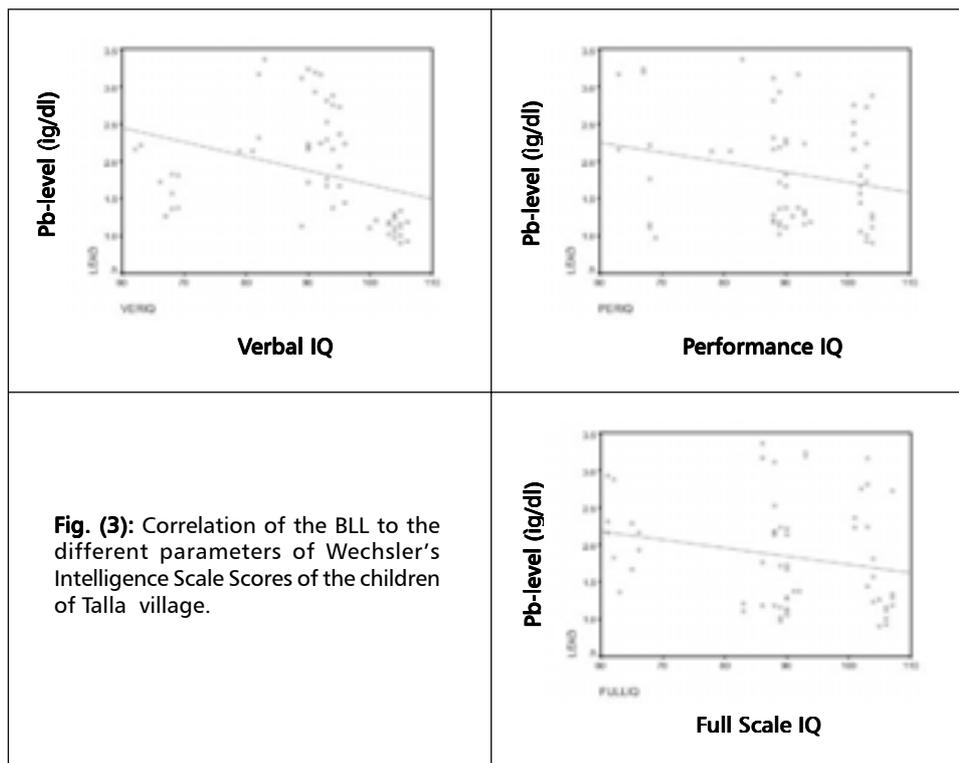


Table 4: Effect of the 1 micg/dl increase of BLL on the different parameters of Wechsler's Intelligence Scale Scores

Lead level	Parameter	El-Newayrat	Al-Shorafaa	Talla	Total
>5 micg/dl	Verbal IQ	1.11	0.00	0.00	3.33
	Performanc IQ	2.22	0.00	0.00	6.67
	Full Scale IQ	3.44	0.00	4.76	5.56
>2 mecg/dl	Verbal IQ	5.59	3.25	6.35	7.16
	Performanc IQ	4.16	4.07	6.02	2.39
	Full Scale IQ	4.16	1.63	8.03	2.82

Table 5: Comparison between males and females regarding the different parameters of Wechsler's Intelligence Scale Scores

Parameter		Males		Females		t-value	P-value
		Mean	SD	Mean	SD		
Lead	El-Newayrat	6.52	1.38	6.20	0.25	0.92	0.362
Verb. I.Q		78.97	12.89	82.81	8.85	1.30	0.199
Perf. I.Q		78.82	11.91	80.04	12.13	0.39	0.699
F. S. I.Q		82.26	15.14	87.65	10.86	1.54	0.130
Lead	Al-Shorafaa	3.95	0.82	3.70	0.73	1.20	0.234
Verb. I.Q		84.18	12.81	89.73	11.83	1.72	0.091
Perf. I.Q		85.74	13.63	89.88	13.85	1.16	0.251
Full S. I.Q		80.29	12.27	84.65	10.24	1.46	0.149
Lead	Talla	1.96	0.79	1.71	0.61	1.32	0.192
Verb. I.Q		91.15	12.12	92.04	13.46	0.27	0.789
Perf. I.Q		90.44	11.40	90.00	12.91	0.14	0.889
Full S. I.Q		90.59	14.08	88.62	14.29	0.53	0.595

Ver. IQ: Verbal IQ, Per. IQ: Performanc IQ, F. S. IQ: Full Scale IQ, *: Statistically significant

suggests that 10 ig/dl, the current CDC, should not be interpreted as a level at which adverse effects do not occur (Télléz-Rojo et al., 2006).

In the less developed countries, where children are still exposed to Pb from leaded gasoline, traditional cosmetics, lead water pipes, and lead-soldered food cans. The reported BLL in these countries ranged from a concentration as low as a mean of 19.6 ig/L in Jordan (Dabbas and Al-Zoubi, 2000), to as high as 50–87% of children having BLL e" 100 ig/L in Cape Peninsula, South Africa (von Schirnding et al., 2001), and Dhaka, Bangladesh (Kaiser et al., 2001). It is to be mentioned that thee is no reports about BLL in Egypt.

Our results reported that there were significant decrements in the verbal, performance and full scale IQs scores in the children from the villages nearby the El-Minia industrial area which were strongly negatively correlated to BLL of 5-10 ig/dl. These findings are in accordance with many studies that suggested that environmental lead exposure in children who have maximal BLL < 7.5 ig/dl is associated with intellectual deficits (Hornung et al., 2009; MMWR Recomm Rep., 2007; Winneke et al., 1996). In addition, this study revealed that every 1 ig/dl increase in the BLL was associated with an average IQ-loss of 1-3 points which was not reported by Winneke and his fellows, 1996, but in agreement with others (International Programme for Chemical Safety, 1995; Centers for Disease Control. Preventing lead poisoning in young children, 1991).

These findings are in agreement with the CDC's Advisory Committee on Childhood Lead Poisoning Prevention that stated that Pb is associated with negative outcomes in children, including impaired cognitive, motor, behavioral, and physical abilities (Centers for Disease Control. Preventing lead poisoning in young children, 1991).

Regarding the relationship between BLL, intellectual functions and gender, it there was no statistically significant difference between males and females regarding the BLL and Wechsler's Intelligence Scale Scores in all investigated children which indicates the negative association of sex and lead effects. This is contradicting with the early reports that considered male gender a risk factor (Nuwayhid et al., 2003), but in accordance with the results of a recent Lebanese paper (Bellinger and Needleman, 2003).

The results of the current study reported that every 1 ig/dl increase of BLL was not accompanied by a fixed lowered score

which indicates the nonlinear relationship. This in full agreement with studies of pediatric Pb exposure and IQ that suggested that the association between measured BLL and IQ is nonlinear, with the decline in IQ greater at lower levels of exposure (Jusko et al., 2008; Télléz-Rojo et al., 2006; Bowers and Beck, 2006, Lanphear et al., 2005). However, Bowers and Beck claim to show that this nonlinearity is artificial because a nonlinear dose-response function is an inevitable result of any regression on data with the distributional characteristics common to these studies (Bowers and Beck, 2006).

The mechanism(s) by which Pb induces such intellectual functions disorders was not the concern of the current study. A coherent theory to explain the particular vulnerability to Pb of the developing brain is still lacking. Recent data do suggest, however, that Pb-induced disruption of calcium homeostasis in the immature brain might interfere with normal brain development. Also, experimental studies have also shown that Pb exposure may have genotoxic effects (Sanders et al., 2009). Cellular models of learning and memory have been utilized to investigate the potential mechanisms of Pb-induced cognitive deficits. Examination of long-term potentiation in the rodent hippocampus has revealed Pb-induced increases in threshold, decreases in magnitude, and shorter retention times of synaptic plasticity. Structural plasticity in the form of adult neurogenesis in the hippocampus is also impacted by Pb exposure. The action of Pb on glutamate release, NMDA receptor function, or structural plasticity may underlie perturbations in synaptic plasticity and contribute to learning impairments. In addition to providing insight into potential mechanisms of Pb-induced cognitive deficits, cellular models offer an opportunity to investigate direct effects of Pb on isolated biological substrates. A target of interest is the 78-kDa molecular chaperone glucose-regulated protein (GRP78). GRP78 chaperones the secretion of the cytokine interleukin-6 (IL-6) by astrocytes. In vitro evidence shows that Pb strongly binds to GRP78, induces GRP78 aggregation, and blocks IL-6 secretion in astroglial cells. These findings provide evidence for a significant chaperone deficiency in Pb-exposed astrocytes in culture. In the long term, chaperone deficiency could underlie protein conformational diseases such as Alzheimer's Disease (White et al., 2007).

In conclusion, low-level Pb environmental exposure could alter the intellectual functions in children even with BLL<10 ig/dl. As some children showed some intellectual functions

impairment at a BLL $\leq 2 \mu\text{g}/\text{dL}$, it is advised to lower the recommended CDC to less than $2 \mu\text{g}/\text{dL}$.

Finally, it is to be mentioned that Pb exposure during childhood is not just a health problem but an economic one as well (Muennig, 2009). This reflects the need for national survey to know how big is the problem in Egypt and to put this problem on the list of national health priorities.

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Medical practice & liabilities in Gulbarga region, Karnataka - A fifteen year retrospective study

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Abstract

Professional liability is the liability that arises because of professional failure resulting in damages to the client who are required to be compensated monetarily either by the professional or his insurer. In a landmark historical judgment, the Honorable Supreme Court has ruled that doctors should not be held criminally responsible unless there is prime facie evidence before the court in the form of a credible opinion from another competent doctor. Preferably a Government doctor in the same field of medicine supporting the charges of a rash and negligent act¹.

We studied total 26 cases, which were filed in Gulbarga district forum (consumers court) out of which Obstetrics and Gynecology is the most professional liability (P L) prone specialty, followed by Surgery, Paediatrics, Orthopaedic, Urosurgery, Ophthalmology, Pathology and Dental etc.

Out of the total 26 cases, 21 cases were dismissed and 5 cases are compensated monetarily. According to Oriental Insurance Company, Gulbarga and Indian Insurance Company, Gulbarga PL claims vary with the specialty. This paper discusses all the reasons and also suggests ways and means to minimize the risk of professional liability claims in Medical practice.

Keywords

Medical Practice, Professional Negligence, Professional liability, Lawsuits.

Introduction

Negligence is an integral part of human nature and doctors are no exception to this. Doctors were, are and will remain accountable for their professional misconduct of medical negligence. Consumer protection act (CPA) 1986 was enacted by parliament to provide for better protection of the interest of consumers in the background of guidelines contained in the consumer protection resolution passed by U.N. General Assembly on 9th April 1985. In the beginning, the medical practice was not covered under this act. However, due to the landmark judgment of Supreme Court in Nov 1995 (IMA v/s V.P.Shantha) the medical practice, barring some minor exception came within the ambit of CPA¹.

In medical practice, PL arises when there is medical negligence of civil nature, the patient claims compensation for the damages, suffered by him, in terms of money. This compensation can be sought by a lawsuit either in a civil court or in a consumer redressal forum / commission in our country.

In the olden times patient did not sue their doctors. Physicians were highly respected in the community, poor outcome of treatment were considered misfortune. Moreover, patients used to understand that their doctor did the best they

could do, under the circumstances. Last century has witnessed drastic change in this sacred doctor patient relationship. Now, this relationship has virtually turned into a consumer provider service. Today physicians are less revered, are subjected to an increasing number of lawsuits, and are often devastated by the astronomical awards of juries. According to ACOG² (American College of Obs & Gynac) 1999 survey on professional liability conducted by Princeton Survey Research Association. 76.5% of its members had at least one PL claim, filed against them during their careers.

Material & methods

The cases which were filed in the District consumer forum Gulbarga between 1991 to 2005 Dec (i.e. 15 yrs). Details of the cases are collected from the district consumer forum Gulbarga and from the consumer forum website. In each case, complaint of the complainant and response to the complaint by the opponent is studied & analyzed. Date of filing and date of judgment is noted in each case. If needed complainant and opponent were consulted personally for details about the case. Details about the PL claims for various specialties are received from the Oriental Insurance company, Gulbarga and New India Insurance Company Limited, Gulbarga.

In each case following points are noted, such as

1. Misguided allegations
2. Communication failure
3. Documentation defects
4. Practice guidelines
5. Consultations
6. Administrative incompetence
7. Negligence.

Case reports

We studied total 26 cases, which were filed between 1991 – 2005 in the consumer forum Gulbarga. Out of total 26 cases, 9 cases are of Obstetrics and Gynecology speciality, 6 cases are of Surgery speciality, 3 cases are of Pediatrics, 2 cases are of Urosurgery, 2 cases are of Orthopedics, 1 case of Ophthalmology, 1 case was related to Casualty Medical Officer (CMO), 1 case related to Pathology, and 1 case of Dental speciality. Among these 26 cases, 21 cases were dismissed and only 5 cases were compensated monetarily. Among the ordered cases, 2 case were of Obstetrics and Gynecology, and 1 case each of Ophthalmology, General Surgery and Pathology.

According to Oriental Insurance Company Gulbarga region³, PL claims and members insured (in Gulbarga region 2009-2010) in various speciality is as follows– Maximum PL is claimed in the Orthopedics (up to 20lakhs) followed by Surgery(upto15lakhs), Obstetrics and Gynecology (upto10lakhs) General Medicine (upto10lakhs), Urologist(upto10lakhs), Diagnostic labs(upto10lakhs) Anesthesia(upto 5lakhs), General practitioner (up to 5lakhs), Radiologist(upto 5lakhs), Ophthalmology(upto 5lakhs), Dental surgeons (upto 5lakhs), Neurophysician (upto 5lakhs), and ENT Surgeons (upto 3lakhs).

Hospitals under omission and negligence policy, PL claim is upto 25lakhs or per patient 10lakhs or upto 40lakhs.

Maximum number of insurers are of Obstetrics and

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Table 1:

Sl No	Specialty	Total sum Insured (Rs)	Annual premium (Rs)
1.	Obstetrics and Gynecology	7,00,000	1400
2.	Surgery	10,00,000	3000
3.	Urosurgery	10,00,000	1600
4.	Ortho	5,00,000	1000
5.	Patho	10,00,000	400
6.	Ophth	3,00,000	600

Gynecology speciality (25 members) followed by General Practitioner (25 members), General Medicine (20 members), Surgery (15 members), Orthopedics (10 members), Radiologist (8 members), Anesthesia (7 members), Dental surgeons (6 members), Ophthalmology (5 members), Diagnostic lab(4), Urologist(3 members) and Neurophysicians(1 member). Number of Hospital insured are 6.

According to The New India Insurance Company Ltd Gulbarga region⁴. Total number of Doctors insured for the period 2001-2002 were 7 members, for the period 2002-2003 same 7 members, for the period 2004-2005 it is increased to 15 members, for the period 2005-2006 17 members, for the 2006-2007 there were 12 members, and for the year 2007-2008 there were 12 members,

Annual premium and sum insured also varies depending upon the specialty which is given in table-1 (for the year 2007-2008).

Discussion

Professional negligence is defined as absence of reasonable care and skill, or willful negligence of medical practitioner in the treatment of a patient, which causes bodily injury or death of patient⁵.

act of negligence, on the part of the treating physician, which causes some suffering, harm or damage to the patient which can be compensated by paying money and does not come under the purview of the Cr.P.C. and I.P.C. and does not demand legal punishment of the doctor⁶.

We studied 26 cases, which were ordered (judgement given). Out of 26 cases the more prone specialty is Obstetrics and Gynecology (9 cases, 34.6%), followed by surgery (6cases, 23.07%), Paediatrics (3 cases, 11.55%), Urosurgery(2 cases, 7.70%), Orthopedics(2 cases, 7.70%), Ophthalmology(1 case, 3.85%), 1 case of Pathology, 1 case of dental and remaining other 1 case.

Out of 26 cases only 5 cases were compensated monetarily. Among the ordered cases,

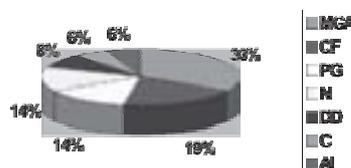
2 cases were of Obstetrics and Gynecology and 1 case each of ophthalmology, General Surgery and Pathology. Among these cases major causes for PL claims are misguided allegation, communication failure, practice guidelines, negligence, documentation defects, consultation and administrative incompetence (Figure-1). The study by ward⁷ showed that 25% of the total lawsuits were indefensible due to the reason such as a) Breach of standard(17%). b) Lack of documentation(3%). c) combination of both the causes (5%). Linch⁸ and others in their analyses described that 46% claims were mere misguided allegation, while 19% of cases were due to incompetent care, in 12% there was error of judgments & 7 % of cases resulted due to failure of communication.

According to The New India Insurance Company Ltd Gulbarga branch in the year 2001-2002 only 7 members were insured and total annual premium was Rs-6520/- including all specialty and total sum insured was 40lakhs. But in the year 2007-2008 total 12 members were insured and total annual premium was Rs-12160/- and total sum insured was 91lakhs. Maximum annual premium was paid by the General Surgery, followed by Urosurgery, Obstetrics and Gynecology,

Orthopedics, Ophthalmology, and Pathology.

If we look into annual premium in US⁹ (1998-1999), maximum annual premium was paid by Obstetrics and Gynecology (35,200(\$)), followed by orthopedic (27,300(\$)), General Surgery (19,700(\$)), Pediatrics (12,300(\$)), General medicine (9,400(\$)), and Psychiatry (5,500(\$)).

1. MGA- Misguided allegations
2. CF- Communication failure
3. PG- Practice guidelines
4. N- Negligence.
5. DD- Documentation defects
6. C- Consultations



7. AI- Administrative incompetence

Conclusion

The major causes observed under different studies, of PL claims can be enumerated as.

- Misguided allegations
- Communication failure
- Practice guidelines
- Negligence
- Documentation defects
- Consultation
- Administrative incompetence and Others.

It is utmost importance that PL claims should be avoided. The lawsuits not only have heavy emotional toll on doctors and patients but on the society as a whole. According to New India Insurance Company, total annual premium and total sum assured is almost doubled from the year 2001-02 to 2007-08. Escalating liability premiums and awards drive up the cost of care and it is not uncommon for demoralized doctor to leave practice. This can result in limited access to good medical care and when the care is available, it is more expensive. Thus, efforts must be made to avoid such a situation by taking preventive steps.

The preventive steps could be taken at 4 different levels¹⁰. Level I (Primary prevention) - That protect against a complaint being filed.

Level II (Secondary prevention) -That would protect the defendant from being held negligent.

Level III (Tertiary prevention)-That would protect against direct financial consequences in case compensation is awarded.

Level IV (Quadratic prevention)-That would protect against professional and psychological stresses of litigation.

It stresses that no single measure can be enough in minimizing PL claims because their level and reasons are so varied, it is must to have comprehensive approach in order to minimize PL claims. By taking care of patient clinically/legally/administratively and specially by improving the above observed factors, we can minimize the PL claims to large extent.

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A study of violent asphyxial deaths at Surat, Gujarat

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Abstract

An increasing death rate as a result of violence constitutes a large group in medico-legal autopsies. Specially, death due to asphyxia is one of the most important causes of violent deaths. Domestic violence plays a great role in suicidal and homicidal violent asphyxia deaths. Various epidemiological and demographical parameters of the study are described in the present article.

In this study, 585 cases of violent asphyxial death were studied. Incidence of asphyxial deaths was averagely 146 cases per year. In violent asphyxial deaths, 73% of total cases were of male while only 27% of cases were of female. Majority of victims were in age group of 21 to 40 years. 80% of cases were of suicide and among them 68.4% of victims made suicide by hanging followed by drowning. Incidence of homicidal asphyxial death was quite rare. Ligature strangulation was the most commonly employed method for homicidal asphyxial deaths. The prime motive behind violent asphyxial deaths was financial problems/disputes. Indoor places were the commonest places used by victims of hanging. Sari, dupatta and cotton rope were commonly used as a ligature material in hanging cases. Ceiling fan and ceiling hook were the ideal suspension point seen in hanging cases. Only in 0.93% of hanging cases hyoid bone fracture was present.

Key words

Domestic violence, violent death, strangulation, hanging, drowning.

Introduction

The physiological definition of "asphyxia" is complex and often means more than hypoxia. In the field of forensic pathology, asphyxia is considered to be a consequence of a struggle to breathe against some mechanical interference with respiration. In violent asphyxial deaths, the process of respiration is prevented by some violent mechanical means. Violent asphyxia can be caused by constriction of neck, by closure of nose and mouth, by occlusion of the lumen of the air passage by some materials, by restricting the movement of the respiratory muscles. Violent asphyxial deaths are of common occurrence and classified as hanging, drowning, strangulation, suffocation and traumatic asphyxia.^{1,2}

Most of the common persons attempt to use some form of device around the throat to strangle. In the event of death, the actual cause of death depends upon the type of hanging, where type usually refers to the length of the drop. Hanging in its face value goes in favors of being suicidal in nature. Accidental hanging may be possible in factories, by children during playing and in masochistic practice but homicidal hanging is rare.

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In a short drop, the victim may die from a lack of air asphyxiating the brain; the patient is likely to experience hypoxia, skin tingling, dizziness, vision narrowing, convulsions, shock and acute respiratory acidosis and if one or both carotid arteries and/or the jugular vein may be compressed sufficiently to cause cerebral ischemia and a hypoxic condition in the brain which will eventually result in or contribute to the death. In the case of a long drop, the patient is likely to suffer a fractured 2nd and 3rd and/or 4th and 5th cervical vertebra which may cause paralysis or death. Hanging is the prevalent means of suicide in pre-industrial societies and is more common in rural areas than in urban areas.³ It is also a common means of suicide in situations where materials are not readily at hand (such as in prisons); hangings is the the easiest suicides to improvise.

In strangulation, the exchange of air between the atmosphere and the lungs is prevented by way of constriction of the neck by means of a ligature material or by some other means, without suspending the body, where the force of constriction is applied from outside and is not the weight of the body or the head of the victim. They are also in form of throttling, garroting and mugging. All types of strangulations in their face value are homicidal in nature. Suicide by suffocation is the act of inhibiting one's ability to breathe or limiting oxygen uptake while breathing, causing hypoxia and eventually asphyxia.⁴ Helium, argon and nitrogen are commonly used in suicides by suffocation. Breathing insert gases quickly renders a person unconscious and causes death without any experience of panic or discomfort.

Suicide by drowning is the act of deliberately submerging oneself in water or other liquid to prevent breathing and deprive the brain of oxygen. Drowning is among the least common method of suicide, typically accounting for less than 2% of all reported suicides in the United States.⁵

Due to population explosion, poverty and unemployment, underemployment and economic disequilibrium, lack of housing and displacement, alcohol and substance abuse, hopelessness and despair, and increasing stress and strain in our daily life, we frequently come across cases of suicides, homicides and accidents. Males and females are both exposed to such stresses but it seems that ours being a male dominated society and more exposure to external environment, such cases are commonly seen in males.

Violence takes its toll on individuals, families, and communities throughout the world. No one is immune to violence. It affects people across the lifespan-from infants to the elderly. Each year, about 50,000 violent deaths occur in United States. Violent deaths, including homicides and suicides, cost the United States more than \$52 billion in medical care and lost productivity every year.⁶

Material and methods

The study included all asphyxial deaths (**n=585**) examined at the Department of Forensic Medicine and Toxicology, Surat Municipal Institute of Medical Education and Research, Surat, Gujarat, India, during the period of 4 years, starting from 1st January 2006 to 31st December 2009.

Cases were included in the category of violent asphyxial

deaths on the basis of confirmation/suspicion by the investigating officer or/and confirmatory or corroborative findings at autopsy examination. Relevant information was reviewed in detail. The anatomical and other objective findings were recorded in the autopsy reports. The demographic characteristics of victims of violent asphyxial deaths (age, sex, motive, used ligature material, suspension point etc.) were recorded at the time of autopsy examination, which were later on organized to retrieve data for observation and discussion. Available literature was retrieved and utilized in discussion with emphasis on different aspects of violent asphyxial deaths.

Observations

Scientifically significant data of medico legal nature are highlighted in tables mentioning below. The figure in bold letters in tables highlights the higher incidence or important parameters.

During period of four years (from 2006 to 2009) 585 cases of violent asphyxial deaths were examined. In every year, number of violent asphyxial deaths was nearly same.

Table 1: Year wise distribution of violent asphyxia deaths

Year	No. of violent asphyxial deaths	Percentage
2006	152	26.00%
2007	143	24.40%
2008	148	25.30%
2009	142	24.30%
Total	585	100%

Table 2: Age wise distribution of violent asphyxia deaths

Age group	No. of violent asphyxia deaths			Total (%)
	Suicidal	Homicidal	Accidental	
0-10	2	3	22	27 (4.6%)
11-20	79	0	16	95 (16.2%)
21-30	189	15	18	222 (37.9%)
31-40	120	6	19	145 (24.8%)
41-50	52	2	9	63 (10.8%)
51-60	23	1	2	26 (4.4%)
61-70	2	0	3	5 (0.9%)
>70	1	0	1	2 (0.3%)
Total (%)	468 (80%)	27 (4.6%)	90 (15.4%)	585 (100%)

Table 3: Sex and manner wise distribution of violent asphyxial deaths

Type of asphyxial death	No. of violent asphyxial deaths			Total (%)	Sex	
	Suicide	HomicideLLI	Accident		Male	Female
Hanging	320	0	1	321 (54.9%)	214	107
Drowning	147	0	87	234 (40%)	200	34
L. Strangulation	0	21	0	21 (3.6%)	8	13
Smothering	1	2	1	4 (0.7%)	2	2
Throttling	0	4	0	4 (0.7%)	2	2
T. Asphyxia	0	0	1	1 (0.2%)	1	0
Total (%)	468 (80%)	27 (4.6%)	90 (15.4%)	585 (100%)	427 (73%)	158 (27%)

Table 4: Week day wise distribution of violent asphyxial deaths

Day	No. of violent asphyxia deaths			Total (%)
	Suicidal	Homicidal	Accidental	
Monday	81	5	14	100 (17.09%)
Tuesday	62	5	9	76 (12.99%)
Wednesday	63	1	9	73 (12.48%)
Thursday	70	3	12	85 (14.53%)
Friday	61	1	19	81 (13.85%)
Saturday	67	8	19	94 (16.07%)
Sunday	64	4	8	76 (12.99%)
Total	468	27	90	585 (100%)

Amongst violent asphyxial deaths, 80% of cases were suicidal in nature followed by accidental cases (15.4%) and homicidal cases (4.6%). The most common age group involved in asphyxial deaths was 21-30 years (37.9%) followed by 31-40 years (24.8%).

T. Asphyxia: Traumatic asphyxia; L. Strangulation: Ligature strangulation

Majority of victims were belongs to male group (73%) which was about 2.7 times higher than female group. Hanging was the commonest method of suicide followed by drowning while ligature strangulation was the commonest method of homicide.

Violent asphyxial deaths were most commonly seen on Monday (17.09%) followed by Saturday (16.07).

Maximum number of violent asphyxial deaths were seen in August (n=63) followed by April (n=59), May (n=52) and September (n=52).

Amongst hanging cases, 99.7% of cases were of suicidal in nature in which 3rd and 4th decade was the commonest group to be involved. In drowning cases, 62.8% of cases were suicidal in nature. 31-40 years age group (29.05%) was the commonest group to be involved in suicidal and accidental drowning cases followed by 21-30 years age group (25.64%). In hanging and drowning cases not a single case of homicide was found.

In suicidal asphyxial deaths, financial problems (40.38%) were the commonest reason followed by family dispute (22.22%). In homicidal asphyxial deaths, the most common motive was financial dispute (48.15%) followed by personal dispute (29.63%).

In homicidal asphyxial deaths (n=30), the most frequently used method was ligature strangulation (n=21) followed by smothering (n=2) and throttling (n=4). Among four cases of smothering, one was accidental and one was suicidal while other two cases were homicidal in nature. Traumatic asphyxia was accidental in nature.

In hanging cases, victims used indoor places (n=313) commonly, while outdoor places (n=8) was used rarely. In ligature strangulation cases, indoor places were commonly used as well as outdoor places were also used. Indoor as well as outdoor places were used for ligature strangulations.

In hanging cases, sari was used as a ligature material in 29.60% of total hanging cases followed by dupatta (19.94%) because of easy availability of these materials in the house, cotton rope (18.07%) and piece of cotton / bed sheet (13.08%).

Ceiling fan (47.35%) was commonly used as suspension

Table 5: Month wise distribution of violent asphyxial deaths

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
Cases	48	43	47	59	52	46	45	63	52	37	48	45	585
%	8.2	7.4	8.0	10.1	8.9	7.9	7.7	10.8	8.9	6.3	8.2	7.7	10

Table 6: Age group wise distribution of hanging and drowning cases

Age group	No. of cases							
	Hanging				Drowning			
	SU	HO	AC	Total	SU	HO	AC	Total
0-10	0	0	0	0	1	0	22	23
11-20	55	0	0	55	24	0	16	40
21-30	146	0	0	146	43	0	17	60
31-40	71	0	0	71	49	0	19	68
41-50	33	0	0	33	19	0	8	27
51-60	13	0	0	13	10	0	2	12
61-70	1	0	0	1	1	0	3	4
> 70	1	0	1	2	0	0	0	0
Total	320	0	1	321	147	0	87	234
%	99.7	0	0.3	100	62.8	0	37.2	100

SU: Suicidal, HO: Homicidal, AC: Accidental

Table 7: Motives / Reasons behind violent asphyxial deaths

Motive	No. of cases		Total (%)
	Suicide	Homicide	
Personal dispute	63	8	71 (14.44%)
Family dispute	104	1	105 (21.21%)
Financial dispute/problems	189	13	202 (40.90%)
Major illness	23	0	23 (4.65%)
Unknown	89	5	94 (18.90%)
Total	468	27	495 (100%)

Table 8: Age wise distribution of smothering, strangulation, throttling and traumatic asphyxia

Age group	Smothering	Strangulation	Throttling	T.Asphyxia
0-10	2	2	0	0
11-20	0	0	0	0
21-30	2	11	3	0
31-40	0	6	0	0
41-50	0	1	1	1
51-60	0	1	0	0
61-70	0	0	0	0
> 70	0	0	0	0
Total	4	21	4	1

Table 9: Place of incidence in different violent asphyxial deaths

Type of death	Indoor	Outdoor	Total
Hanging	313	8	321
Drowning	5	229	234
Smothering	2	2	4
L. Strangulation	12	9	21
Throttling	1	3	4
Traumatic asphyxia	1	0	1
Total	334 (57.1%)	251 (42.9%)	585 (100%)

Table 10: Type of ligature material used in hanging cases

Ligature material	No. of cases	Percentage
Sari	95	29.60 %
Dupatta	64	19.94%
Cotton rope	58	18.07%
Nylon rope	12	3.74%
Electric / cable wire	27	8.41%
Piece of cotton/ Bed sheet	42	13.08%
Leather belt	23	7.16%
Total	321	100%

Table 11: Suspension point in hanging cases

Suspension Point	No. of cases	Percentage
Ceiling fan	152	47.35%
Ceiling hook	83	25.86%
Iron angle	39	12.15%
Branch of tree	7	2.18%
Electric pole	1	0.31%
Door handle	12	3.74%
Roof pipe	27	8.41%
Total	321	100%

Table 12: Age wise distribution of hyoid bone fracture in violent asphyxial deaths

Age group	No. of cases			Total n=346
	Hanging n= 321	L. Strangulation n= 21	Throttling n= 4	
0-20	0	0	0	0
21-40	0	0	0	0
41-60	2	2	1	5
>61	1	0	0	1
Total	3 (0.93%)	2 (9.52%)	1 (25%)	6

point by the victims of hanging followed by ceiling hook (25.86%), iron hook (12.15%) and so on.

Among 321 cases of hanging, only 3 cases (0.93%) showed hyoid bone fracture. Among these, 2 victims belong to 41-60 years age group while one victim was greater than 60 years. Out of 21 cases of ligature strangulation, 2 cases showed hyoid bone fracture which belong to 41-60 year age group.

Discussion

In medico legal cases, the forensic pathologist must determine the cause of death and the circumstances of death, without any clinical history or clue to guide him except the lesion of trauma or disease which he discovers in post mortem. The recognition of asphyxia as a cause of death at autopsy is occasionally difficult and requires considerable care, skill and understanding based on experience of the forensic pathologist. When a mechanical asphyxial death is suspected, the following method is a convenient routine procedure in our laboratory.⁷

1. External Examination: A systematic and careful examination of the external feature is made.
2. Internal Examination: A "U" shaped incision is the most satisfactory method to inspect the internal tissues of neck in situ.
3. Laboratory Investigation: The tissue examined routinely under the microscope is cervical lymph node, tongue, carotid body, lung, cortex of brain and skin. The heart's blood is collected to examine the fibrinolytic factors and thyroid hormones.

Now a day, hardly a day passes without news of unnatural death in the form of suicidal, homicidal or accidental in popular newspaper. Asphyxia is one of the modes of death. Violent asphyxial deaths are the result of domestic violence or society violence. The incidence of death due to violent asphyxia found in this study was 13 % of total autopsies done in our department which was at variance from the study conducted by Gargi *et al*⁸ (3.9%) and Singh A *et al*⁹ (5.26%).

Male victims were commonly involved in violent asphyxial deaths. In this regard the present study is in the same line with most of the authors. The male predominance may be explained by the fact that males by nature indulge in more violent activity as compared to female. In India, male group is the earning member of the family. Higher incidence of violent asphyxial deaths was seen in the age group of 21-40 years. Persons in this age group are more active, violent and more vulnerable to the fast changing social trends and cultures. BL Meel¹⁰ reported 16-30 years age group (51%) was involved in half of the asphyxial deaths.

Accidental asphyxial deaths (n=22) were most commonly seen in below 10 years age group. All these cases were of drowning. Children are more active in this age group. They all are much more attractive to water places and don't know swimming. In this group, they don't have enough power to save him from such a critical condition. Suicidal and homicidal asphyxial deaths were rare in this group while higher in 21-40 year age group.

Incidence of different types of asphyxial deaths was recorded. Hanging (54.9%) was the commonest which is higher than Singh A *et al*⁹ (24.3%) and Gargi *et al*⁸ (20.7%). In the

present study, incidence of drowning (40%) was higher than Gargi *et al*⁸ (32.4%) and less than Singh A *et al* (59.4%). It can be explained that Surat city is situated on the bank of Tapi river. Hanging was commonly seen between 21-30 years of age group (45.48%) while drowning cases although involve all age group with predominance in 31-40 years of age group (29.05%) which were consistence with the findings of Kulshrestha P *et al*¹¹.

Incidence of violent asphyxial deaths was observed to be higher in August (10.8%) and April (10.1%) while lowest in October (6.3%). This observation is contrast to the findings of B L Meel¹⁰ that cases of asphyxial death were observed to be higher in November (13%) and least in September (5%). It is the one of the thought that Monday is the first working day of the week and the work tension or rushing working hours may precipitate for violent suicidal and accidental deaths similarly Saturday is the last working day of the week and on the other side the factors responsible for tension or situation responsible for may accumulate on the last day of week.

In the present study, it was observed that 68.37% of suicidal victims were adopted hanging as a way to end life which was followed by drowning (31.41% of suicidal victims). Amongst the hanging cases, indoor places (97.5%) like kitchen, drawing room, bathroom, toilet, balcony inside house were considered as ideal places for suicide which were not similar to the study by Olive Bunnewith¹² *et al* (65.4% of suicidal victims hanged in indoor places and 34.6% cases hanged outside). It is to be explained that for suicide, way of hanging doesn't required any pre-planning or any specific instrument. Male predominate both in hanging and drowning in the present study which was consistence with the findings of Kulshrestha P *et al*¹¹.

The prime motive behind suicidal asphyxial deaths was financial problems. During recession period of 2008-2009, incidence of suicidal hanging and drowning was seen more in our city. Surat city is textile city as well as diamond city. Labor class and Business class were more in this city. During recession period, many families came across the financial problems and earning member of the family especially male group adopted ways of suicide by hanging and drowning. 4.9% of suicidal deaths were due to major illness like cancer, rheumatoid arthritis, HIV, psychiatric disorders, chronic renal failure etc. The financial dispute was also the commonest motive behind homicidal asphyxial deaths. Whenever money is involved, crime will be there.

Ligature strangulation, smothering and throttling were commonly encountered in middle age group (3rd and 4th decade). Among all these, ligature strangulation (77.78%) was the commonest mode of homicidal asphyxial deaths. Ligature strangulation and throttling were commonly encountered in female group for homicidal purpose because they offer less resistance to the person who is strangulating or throttling. This finding is consistence with the finding of Kulshrestha P *et al*¹¹, Singh A *et al*⁹, Singh O Gambhir *et al*¹³.

In the present study, 29.60% of hanging cases hanged by sari while dupatta (19.94%), cotton rope (18.07%) and piece of cotton/ bed sheet (13.08%) were also used which was not consistence with Olive Bunnewith *et al* that 98.8% of hanging cases used rope or cord as ligature material. It is to be easily explained that household things like sari, dupatta, cotton/nylone rope, electric/cable wire, leather belt, piece of cotton, bed sheet, shirt etc. are easily available without any preparation. Ceiling fan (47.35%) and ceiling hook (25.26%) were used as ideal suspension points for hanging. Tree (87.5% of total outdoor hanging) was the most commonly used in outdoor hanging which was not similar to the findings of Olive Bunnewith *et al*.

The hyoid bone may be fractured in persons above 40 years of age due to fusion of greater cornu of hyoid bone to its body. Hyoid bone may be fracture in older persons in 15 to

20% of hanging cases according to K S N Reddy¹⁴. According to Apurba Nandy¹⁵, fracture of hyoid bone in hanging cases occurs in 5-10% cases. In the present study, only 3 cases (0.93%) found in which fracture of hyoid bone seen which is somewhat similar to the finding of R N Karmakar¹⁶ that hyoid bone fracture was not seen in a single case from 500 cases of hanging.

Out of 346 cases, only 6 cases (1.74%) found in which hyoid bone fracture seen. Among these, 5 cases were belong to 41-60 years age group and 1 case belong to more than 61 year age group. This finding is similar to many authors that possibility of hyoid bone fracture is commonly seen above the age of 40 years due to fusion of greater cornu of hyoid bone to its body during period of 40-60 year. Hyoid bone fracture was more commonly seen in different type of strangulation cases as compared to hanging cases. The higher frequency of hyoid bone fracture in different type of strangulation due to excessive pressure was given by assailant to the victim to end the life of victim at any cost. Broad and firm ligature material, long drop and age more than 40 years are required for hyoid bone fracture in hanging cases. In this study, frequency of hyoid bone fracture in strangulation was 10 times more than hanging cases.

Conclusions

1. Out of 4497 autopsies, 585 cases (13%) were belonging to violent asphyxial deaths.
2. Younger age group (3rd and 4th decade) showed more involvement in asphyxial deaths.
3. Involvement of male group was 2.7 times higher than female group.
4. Hanging was the commonest method for suicide.
5. In violent asphyxial deaths, commonest method for homicide was strangulation.
6. The prime reason / motive behind suicidal and homicidal asphyxial deaths were financial problems / dispute.
7. Indoor places were the commonest places used by victims of hanging.
8. Most commonly used ligature materials were sari, dupatta, and cotton rope in hanging cases.
9. Ceiling fan or ceiling hook was the commonest suspension point in hanging cases.
10. Out of 321 hanging cases, only 3 cases (0.93%) which were more than 40 years showed hyoid bone fracture.
11. Frequency of hyoid bone fracture in strangulation was 10 times more than hanging cases.

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Autopsic investigations of the morphological variations of the internal jugular venous valve

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Abstract

The internal jugular vein is a popular route for central venous catheter placement. The internal jugular veins are important venous vessels for returning blood from the brain. The internal jugular vein valves are the only venous valves between the heart and the brain. Internal jugular valve incompetence may result in retrograde cerebral venous flow during coughing and other precipitating activities. We investigated forty cadavers from legal autopsies to observe the morphological variations of the internal jugular venous valve. Valves were present bilaterally in 38 (95.0%) subjects and unilaterally in 2 (5.0%) subjects. Bicuspid valves were present in 70.5% of the valves we examined. Since the internal jugular vein is increasingly used for vascular access, knowledge about and evaluation of these valves may be useful in clinical practice to avoid damaging them during percutaneous procedures.

Introduction

Internal jugular vein (IJV) catheterization is commonly used to obtain central venous access for hemodynamic monitoring, long-term administration of fluids, antibiotics, total parenteral nutrition, chemotherapeutic drugs, and hemodialysis.^{1,2} The anterior jugular venous system (with its interconnections to the subclavian and deep jugular veins) provides a collateral venous network across the midline of the neck area. This area is especially important in the unilateral occlusion of the innominate vein. Harvey's drawings of peripheral venous valves are well known; however, he and his teacher were aware of the presence of venous valves in the IJV.³ In fact, Harvey wrote in 1628 that "the edges of the valves in the jugular veins hang downwards, and are so contrived that they prevent blood from rising upwards."⁴ The IJV valve is the only protective vessel valve between the heart and the brain.⁵ Jugular venous valves are clinically important since an incompetent valve may be associated with increased intracranial pressure.⁶ The medical literature contains many reports and discussions concerning the presence and clinical significance of competent jugular venous valves. Nevertheless, many physicians remain unaware of the presence of the IJV. We investigated the autopsy data of IJV valves from 40 individuals.

Material and methods

We collected the autopsy data of 40 individuals (24 males and 16 females who ranged in age from 17 to 85 years and had a mean age of 59.5 years). The subjects involved in the study were healthy. None of the subjects had a history of cerebrovascular disorders, pulmonary disease, right-sided heart failure, neurological diseases, or notable trauma to the cervical and supraclavicular region. The ethics committee of our university approved the study, but waived the need for consent from the patients' next of kin because the autopsy was dictated by law.

Results

We examined 78 valves. Valves were present bilaterally in 38 (95.0%) subjects (Fig. 1, 2). Two (5.0%) female subjects had

unilateral valves. Twenty-one (27%) valves were unicuspid (8 valves on the left side and 13 valves on the right side); two (2.5%) valves were tricuspid; and the remaining 55 (70.5%) valves were bicuspid. Table 1 summarizes the results.

Fig. 1:



Fig. 2:



Table 1: The number and type of morphological variation of the internal jugular venous valves present in the 40 subjects

	Left 0 t (absent valve)	Left 1 (unicuspid valve)	Left 2 (bicuspid valve)	Left 3 (tricuspid valve)
Right 0 (absent valve)				
Right 1 (unicuspid valve)	1	6	6	
Right 2 (bicuspid valve)	1	2	23	
Right 3 (tricuspid valve)				1

Discussion

The competence of the IJV valve is crucial in maintaining the transcranial blood pressure gradient during cardiopulmonary resuscitation with closed-chest compression.⁷ This valve also prevents a sudden increase in the IJV pressure during coughing or during positive pressure ventilation, and

may thus protect the brain from acute increases in intrathoracic pressure.^{8,9} This feature is unimportant in neurologically normal patients, but may be important in patients with compromised cerebral perfusion (e.g., after head trauma or neurosurgery).¹⁰ At the same time, the functional or morphological incompetence of the IJV valves or the absence of the IJV valves may cause cough headache, cerebral morbidity after positive end-expiratory pressure ventilation, and some types of cerebrovascular diseases.⁶ Transient mesiotemporal ischemia induced by venous congestion may be a potential cause of transient global amnesia (TGA).¹¹ In 1998, Lewis originally proposed the venous congestion hypothesis for TGA.¹¹ It is primarily based on the observation that the onset of symptoms is often correlated with prior Valsalva-like activities, which in turn may lead to venous reflux through the IJV. In anatomical studies, aplasia is reportedly present in as many as 16% of non-selected patients, but the scientists involved in the studies did not assess valve competence.¹² In humans, approximately 90% of internal jugular veins have a valve.^{13,14} In a preclinical study, Imai et al. reported that competent IJV valves became incompetent after being intentionally punctured with a 14-gauge needle.⁹ Since the IJV valve may be situated slightly above the clavicle at the base of the neck, Imai et al. raise the concern that the valve may be injured in clinical situations when the IJV is cannulated at the lower neck for the insertion of a central venous catheter.^{8,9} In our study, 95.0% of the subjects were present. The clinical importance of such an abnormality is not clear yet. Venous back pressure due to the incompetence or absence of the IJV valves may give rise to transient blood flow disturbances in the brain. Incompetence of these valves may be associated with respiratory brain syndrome.^{6,11,15,16} Positive end-expiratory pressures for long periods of time may induce incompetence of the IJV valves with subsequent cerebral venous back flow. This would contribute to the venous engorgement noted in patients undergoing this treatment. The presence and competence of the IJV valves may prevent respiratory brain syndrome. However, a thrombus may easily develop from venous congestion and blood coagulation resulting from IJV catheterization.

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Effects of common contaminants on blood group factors in medico-legal ground

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Abstract

Blood grouping reveals vital information regarding identification, in relation to crime investigation. The technique used for grouping needs to be valid and reliable irrespective of the condition of the collected sample. Stains contaminated with common agents like dust, rust, bacteria and detergent give inconclusive results by mixed agglutination method with passage of time. The results may be accepted with caution, as the opinion might be medico legally significant.

Keywords

Blood group; contamination; mixed agglutination; medicolegal.

Introduction

Blood is considered to be the most common trace evidence obtained from the scene of crime. Collection of bloodstain from the scene of crime as well as from the victim and suspects is an important procedure for crime investigation. It can relate the crime with weapon of offence, place of occurrence and also the criminal.

The blood, in such cases is usually found to be contaminated with: (i) dust (ii) rust on steel / iron weapon (iii) bacteria or (iv) detergent (when stains in clothing are washed with detergent powder). More over, bloodstain may be left over in hot sunlight during summer if not collected in time or blood sample in test tube kept in room temperature.

Aims and objectives

The authors have tried to observe the effects of above mentioned contaminants on different blood group factors (A, B, O and Rh) i.e. whether contamination may cause any effect on detection of blood group during passage of time and the reliability of such tests.

Materials and methods

Blood samples of known groups were collected from the blood bank. 5cc of blood in each of 6 sterile tubes were taken. The tubes were marked as dust, rust, bacteria, detergent, control and room temperature respectively. Pinch of dust, old rusted bunch of pins, and sterile piece of gauze soaked in detergent solution and air dried, staphylococcus aureus from culture media were mixed with the respective marked tubes. The tube marked as room temperature was kept in room temperature of the laboratory, which varied between 34°C to 36°C in the summer months. Rest of the tubes was kept in

refrigerator between 0°C to 4°C. The samples from different tubes were examined every alternate day for three weeks. Mixed agglutination reaction by known antisera was done by slide method, giving sufficient time for reaction to occur. The positive reactions are denoted by (+) and where no agglutination was noted is denoted by (-) symbol in the observation chart.

Observations

Our experiment revealed that the control sample and the test sample marked rust retained agglutinogenic activity even after three weeks where as the other test samples showed negative results by the 17th day. It was only in the second week that negative results started to appear. The sample stored at room temperature and the one contaminated with staphylococcus aureus were the ones to be affected earlier. On the 10th day A and B groups showed negative results in the tubes marked dust while Rh was weakly positive. The reverse was observed in the tube marked detergent. Table 1.

Discussion

The reliability of blood grouping from contaminated stains have been questioned in the past. Enticknap [1] states that the standard techniques give valid results for grouping of ABO and Rh group from red cells extracted from cadavers many hours after death. The stability of red cell agglutinogens in vitro has been studied and occurrence of false agglutinogens in stored blood has also been reported.

In the present study the sample stored at room temperature was weakly positive at day 4 and the earliest to show negative as rapid decomposition of blood occurred. Decomposition can also be attributed to the negative result of the Staphylococcus aureus contaminated sample. Our study supports the findings of Gettler and Kramer [2] who strongly advised against the use of blood grouping of decomposed and contaminated stains, as the results may be inconclusive. Pereira [3] reported the possibility of erroneous interpretation of results of ABO grouping by absorption elution method from decomposing human muscle tissue.

Rust (ferric oxide) did not show any effect on the RBC or the agglutinogenic capacity and grouping could be satisfactorily done upto the third week. Chase [4] reported the existence of a gram negative coccobacillus which affected the blood group A substance. Gilmore and Howe have studied the effects of aerobic soil microorganisms [5] and cell free extracts [6], which decomposes blood group substances. In the present study also the dust contaminated sample gave negative result for A and B on the 10th day where as the Rh factor showed negative result much later on the 17th day. Thus in all probability the findings was due to the effects of some microorganisms in the dust which affect A and B substance more.

In the sample marked detergent the Rh was negative at 10th day while the A and B group showed positive result. Subsequently by the 17th day all were negative. It has been established that haemagglutination is dependent on the membrane flexibility and deformability of the erythrocytes, which in turn is influenced by the ATP content [7, 8]. Nishi K et. al. [9] showed that substance like glutaraldehyde causes a

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Table 1: Results of blood grouping of various samples with passage of time. (Only those days are stated when some changes were observed)

Day	Group	Control	Room temperature	Rust	Dust	Bacteria	Detergent
Day 1	A	+	+	+	+	+	+
	B	+	+	+	+	+	+
	Rh	+	+	+	+	+	+
Day 5	A	+	Weakly +	+	+	+	+
	B	+	Weakly +	+	+	+	+
	Rh	+	Weakly +	+	+	+	+
Day 11	A	+	-	+	-	-	+
	B	+	-	+	-	-	+
	Rh	+	-	+	Weakly +	-	-
Day 17	A	+	-	+	-	-	-
	B	+	-	+	-	-	-
	Rh	+	-	+	-	-	-

dose dependent decrease in agglutinability of erythrocytes. The detergents contain alkaline agents, which alter the fragility of the erythrocyte membrane that in turn affects the antigenicity.

Conclusion

Blood group factors though are very important for fixing up the identity, yet may be misleading under certain circumstances. Grouping by haemagglutination method is unreliable in case of contaminated and decomposed blood and may not yield any results in old stains. However rust did not show any effect on blood group factors and hence recovery of the weapon of offence for blood stain has more value than stains collected from old washed wearing apparels or the soil.

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Estimation of co-relation between middle finger length & stature of females in South Indian population

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Abstract

Determination of stature is an important parameter of personal identification along with others like age, sex, race etc of an individual. The present study is an attempt to examine the relationship between the statures of middle finger length of 100 females of Karnataka, in south Indian population in age ranging from 17 to 19 years. Linear and multiple regression equations for stature estimation were calculated.

The co-relation coefficient between stature and middle finger length were found to be positive and statistically highly significant ($p < 0.01$). The highest co-relation co-efficient is $- (+0.96)$. The regression formula was checked for their accuracy and reliability.

Key words

Human Anatomy; Anthropology; Stature; South Indian population;

Introduction

Estimation of stature of an individual from the skeletal remains from the mutilated amputated limbs has obvious significance in the personal identification. Studies on the estimation of stature from them, that is skeletal remains or from the mutilated limbs, mostly of the long bones have been reported as indicated by the published work of the Pearson,¹ Trotter and Glessner² and Steels formula³. The Indian perspective of the problem of stature estimation has been studied by the Thakur and Rai⁴, Saxena⁵, Bhatnagar et al⁶, Jasuja et al.^{7,8,9} And estimation of stature from foot prints by Raju et al.¹⁰ Estimation of stature from hand, finger and phalangeal length has been reported (Saxena⁵; Thakur and Rai⁴; Shintaku and Furuya¹¹; Tyagi et al¹²; Begum¹³; Sharma and Kapoor¹⁴.) To the best of our knowledge, only Sharma and Kapoor,¹⁴ has reported from this aspect therefore, in present study, an attempt has been made to estimate the stature from middle phalangeal length measurements.

Material and methods

Present study is based upon various measurements of stature, individual phalangeal length of middle finger. Subjects that included 100 females were of age ranging from 17 to 19 years. Data was collected from the students of SSIMSRC campus. Care has been taken for inclusion of the unrelated subjects only. Subjects were mostly having right handed preponderance. Measurement of stature was taken by a standard Anthropometer¹⁴ and middle finger length was taken by sliding caliper¹⁶.

Measurements

1. Stature: It was measured as vertical distance from the vertex to the floor. Measurement was taken by making the subject stand erect on a horizontal resisting plane bare foot. Palms of hand were turned inwards and fingers horizontally pointing downwards¹⁷. Anthropometer was placed in straight vertical position in front of the subject with head oriented in eye-ear-

eye Plane (Frankfurt Plane).¹⁵ The movable rod of the Anthropometer is brought in contact with vertex in the mid saggital plane.

2. Middle finger phalangeal length: It was measured as the distance from the most proximal flexion crease of middle finger, till the projecting point on the tip of the finger. It was measured with the help of a sliding caliper¹⁶.

Results

The results of the stature and the middle finger length measurements of 17-19 years. Present study is evident as shown in the table-1, that mean stature in the females is higher as compared to that of Baul (1974), Thakur (1975), Jasuja (1987), Kler (1990) have also studied the stature.

Middle Finger length statistics are given in the table 1. Present study is there exists statistically significant. 'P'- value < 0.01 .

Statistical correlation coefficient

Present study is evident as shown in the table-2, that the measurements have a positive as well as a statistically significant correlation with the stature. Saxena (1984) also reported statistically significant correlation between stature and hand length. Shintaku and Furuya (1990) reported for Japanese women a correlation of proximal phalange and stature ranging from 0.521-0.696. Therefore an attempt has been made to

Table 1:

Age (Years)	No of students	Mean (cms)	SD (cms)	Mean (cms)	SD (cms)
17	19	9.97	0.41	160.89	5.47
18	77	9.70	0.53	156.84	6.63
19	4	10.08	0.29	164.25	0.96
Total	100	9.77	0.51	157.91	6.587553

draw the regression equations to estimate stature from middle finger length measurements by using regression equation for stature estimation from middle finger length measurements = $90.54 + 6.9 (MFL)$

(* MFL - Middle Finger Length)

Middle finger phalangeal length and medium regression equation

The present study, regression equations have been formulated with the standard error ranging from 0.95 to 1.51 centimeters in case of the females. The standard error difference measured ranges from 0.96 to 5.47 centimeters, which again indicates that both the parameters are efficient to indicate the estimation. It also indicates that either of two can be used for stature estimation, which is of great significance. As references indicate that very little work has been done for estimation of stature from middle finger length

Table 2:

Coefficient of correlation
$r = 0.53$ $P < 0.01$ Significant
Regression equation (predictor of ht)
$Ht = 90.54 + 6.9(MFL)$

Table 3:

Middle Finger length(cms)	Predicted Height(cms)	
	Mean	SD
8.0-8.99	151.49	0.95
9.0-9.99	156.76	1.77
10.0-10.99	161.43	1.51
11.0-11.99	170.00	-

except one reported by Shintaku and Furuya (1990). Kapoor (1987) and Sharma and Kapoor (2001) reported estimation of stature from finger tip length and finger print tip length among criminals. While Shintaku and Furuya (1990) studies proximal phalange in females only, Sharma and Kapoor (2001) have studied distal phalange in males only. In present study, middle finger has been studied for stature estimation in female individual of south Indian population.

Conclusion

100 female subjects have been studied for their stature and middle finger length. Statistically significant correlation is present among the stature and middle finger length measurements. The regression equations have been derived from these measurements and concluded that stature can be estimated from actual as well as measurements of middle finger length by the regression formulae $Ht = 90.54 + 6.9 X (MFL)$.

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Idiopathic pulmonary artery aneurysm: A case report

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Abstract

Pulmonary artery aneurysm is an uncommon disease with a reported incidence of 1 in 14000 in autopsies. As the symptoms are non-specific, limited number of cases are diagnosed antemortem. It can grow to an impressive size before identification and life-threatening complications could occur in the setting of rupture or dissection. This communication reports a death of a 56-year-old man, who presented with a history of difficulty in breathing and dry cough, right parahilar opacity of unknown origin in the chest x-ray and who died due to respiratory failure following obstruction of the tracheo-bronchial tree by an idiopathic right pulmonary artery aneurysm. It highlights that although most of the patients present with non-specific symptoms, pulmonary artery aneurysms are usually apparent on chest x-ray and must be taken into consideration in the differential diagnosis of mediastinal masses.

Key words

Aneurysm, idiopathic, pulmonary artery,

Introduction

Pulmonary artery aneurysms are an infrequent disease (Bartter, 1988) that may be congenital or acquired with a reported incidence of 1 case per 14,000 autopsies (Deterling and Clagett, 1947). Nowadays the incidence may be even lower than early estimates because innovations in medicine and surgery have significantly reduced the incidence of some of the common aetiologies. Idiopathic pulmonary artery aneurysms are very rare (Arnaoutakis et al., 2009) with poorly understood pathogenesis. Due to non specific presentation, a limited number of cases are diagnosed antemortem and therefore it is poorly appreciated by clinicians.

Case report

A 56-year-old man was admitted with a history of difficulty in breathing and dry cough for 1 month. He was a non smoker.

Clinical examination revealed a blood pressure of 120/70 mmHg, pulse at a rate of 76 beats per minute and a respiratory rate of 24 breaths per minute. He was dyspnoeic and displayed bilateral rhonchi and crepitations. No cyanosis was present. Electrocardiogram revealed a right axis deviation. The chest x-ray showed right parahilar opacity of unknown origin (Fig. 1). Routine blood investigations were normal. A complete work up for systemic and infectious diseases was found to be negative. There was no history of chest trauma.

With symptomatic treatment he improved. Although plans were made to do a transoesophageal echocardiogram he collapsed suddenly and was pronounced dead 3 days after admission.

Autopsy revealed an unruptured right pulmonary artery aneurysm, 7 cm in diameter (Fig. 2). This had compressed the carina and right main bronchus leaving a narrow tracheobronchial lumen. A laminated thrombus was seen inside the aneurysm. The thrombus was not extended beyond the aneurysmal sac. There was no pulmonary thromboembolism.

Fig. 1: Chest X-ray showing right parahilar opacity



Fig. 2: Pulmonary artery aneurysm at the hilum of right lung



Multiple atheromatous plaques were seen in the pulmonary arterial tree. Pulmonary oedema was prominent. Bronchial asthma and other natural lung pathologies were excluded. There was right ventricular hypertrophy.

Congenital cardiac anomalies, systemic and pulmonary hypertension, tuberculosis, syphilis, vasculitis, cystic medial necrosis, Marfan's and Ehlers Danlos syndrome were excluded. Histopathological examination of the arterial wall showed fibro atheromatous thinning of the right pulmonary artery with an attached thrombus and found to be negative for any systemic inflammatory or infectious diseases.

Discussion

Pulmonary artery aneurysm was first described by Churton (Churton, 1897). Thereafter, a study done by Deterling and Clagett spanning a period of 100 years showed only 8 cases among 109,571 autopsies (Deterling and Clagett, 1947). Although it is rare this can grow to immense proportions before diagnosis and could become a potentially life threatening condition in the setting of rupture or dissection. This could be unilateral (Cin et al., 1996) or bilateral (Kodikara and Sivasubramaniam, 2009).

Arom and colleague reported on the causative and associated factors of pulmonary artery aneurysms. The most common cause was an association with congenital cardiac defects as noted in 47%, with a patent ductus arteriosus (Arom et al., 1995). Syphilis was the second most common cause, accounting for one third of the cases. The other aetiological causes include structural vascular anomalies, absent pulmonary valve syndromes, tuberculosis, systemic and pulmonary hypertension, cystic medial necrosis, vasculitis, degenerative changes of the elastic media, trauma, arteriovenous fistula,

Marfan's and Ehlers Danlos syndrome and Behcet's disease. Some of the major causes of acquired pulmonary artery aneurysms in the past are now better controlled since the introduction of antibiotics and novel surgical procedures which have significantly reduced the incidence of some of the common aetiologies.

In this case, the patient presented with difficulty in breathing and cough with a right parahilar, middle mediastinal shadow on chest x-ray (Fig.1). The differential diagnosis for a parahilar middle mediastinal shadow on chest x ray include, bronchogenic cyst, lymphadenopathy, thyroid masses, tracheal tumours aortic and pulmonary artery aneurysms and pericardial tumours such as biphasic synovial sarcoma. The symptoms are usually non-specific (Ling, 2009), as in this case, such as haemoptysis, clubbing, dyspnoea, chest pain and cough and most patient presents with a vascular dilatation on chest x-ray (Dayioglu et al., 2004).

Large pulmonary artery aneurysms can become symptomatic due to local compressive effects on the trachea, bronchi, superior vena cava or recurrent laryngeal nerve. It is justifiable to assume that the same haemodynamic forces promote growth of the pulmonary artery aneurysm based on Laplace's law even in the lower pressure circuit. Therefore it could rupture. Other possible complications include dissection, intra-pulmonary erosion and pulmonary embolism.

In this case, the aneurysm had grown to an impressive size at the time of death. As a result, chronic irritation and compression of the carina and right main bronchus would have caused difficulty breathing, cough, tachypnoea and rhonchi. Irritation of the recurrent laryngeal nerve would have further aggravated a cough. Crepitations, pulmonary oedema, right ventricular hypertrophy with resulting right axis deviation were due to pulmonary hypertension secondary to pulmonary artery aneurysm.

Dyspnoea, chest pain, haemoptysis, or the large size of the aneurysm may be the indicators of forthcoming fatal rupture (Deterling and Clagett, 1947; Bartter et al., 1988; Durieux et al; 1981). The definitive diagnosis needs trans-thoracic echocardiography and other imaging techniques including pulmonary angiography, magnetic resonance imaging or computed tomography (Gould et al., 1977). Magnetic resonance imaging has emerged as a useful non-invasive imaging modality that is ideal for the detection of possible intimal flaps and for long-term monitoring of the size of the aneurysm (Nair and Cobanoglu, 2001).

The precise mechanism of the pulmonary artery aneurysm in this patient is indistinct; however, a structural weakness of the pulmonary arterial wall may be a plausible explanation for the development and progression of the pulmonary artery aneurysm. Some idiopathic cases of pulmonary artery aneurysm may be associated with the Hughes-Stovin syndrome, a rare syndrome with recurrent superficial and deep venous thrombosis, an increased intracerebral pressure (due to venous thrombosis) and pulmonary artery aneurysm (Bartter et al., 1988; Ali-Munive et al., 2001). In the present case deep venous and cerebral venous thrombosis was not observed.

Conclusion

The cause of death was concluded as respiratory failure following obstruction of the tracheobronchial tree by an idiopathic right pulmonary artery aneurysm. Although most patients present with nonspecific symptoms, pulmonary artery aneurysms are usually evident on chest x-ray and must be taken into consideration in the differential diagnosis of mediastinal masses.

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Prognathism as race appraisal criterion in a study of 60 Indian crania of known sex using metric and non-metric modes – Assessment of methodology

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Abstract

Race assessment is one of the essential components in establishing identification of an individual from human skeletal remains. The skull stands out as the most reliable amongst skeleton for determining racial affinity, both morphologically and osteometrically. Inferring from observations related to morphological indicators depends largely upon the experience of the observer while adequate level of methodological standardization, is an essential precondition at the outset. Variability with regard to prognathism among members of all major racial groups is more a rule than exception. Assessment of race, using metric studies vis-à-vis morphological indicators was put to comparison and tested for reliability of methodology in the present study, subsequent to estimation of prognathism by both methods on skulls of 60 Indian individuals of known sex (30 of either). The prognathism was estimated (1) non-metrically – by inspection using casts prepared and standardized by Australian National University and (2) metrically - by calculating Gnathic Index (as defined by Breathnach, 1965). The results of both studies revealed that of a total of 60 Indian skulls studied, 50 skulls were found to have orthognathic profile (Gnathic Index < 98) by Metric Study in contrast to Non-Metric Study where only 16 skulls showed 'Small' Grade prognathism. Subsequent to chi-square test, the difference between Metric and Non-Metric study was significant ($X^2 = 38.922559$). Consequently it can be stated that determination of prognathism applying metric studies is superior in reliability compared to morphological indicators using casts.

Keywords

Craniometry; race determination; gnathic-index; human identification.

Introduction

Skeletal remains contain an abundance of information which can lead to reliable determination of age, sex, race and stature of the individual in life (Buchner, 1985). The skull is the best part of the skeleton to use for the determination of racial affinity, both morphologically and osteometrically (Novotny et al., 1993). The areas of the face in the vicinity of the nose, mouth, and cheekbones are the most useful in determining race (Kerley, 1977).

Forensic identification often involves fragmentary remains. Indeed, it is in cases with incomplete remains that metrical rather than observational methods are most helpful (Burriss and Harris, 1998).

Ideally, both approaches should be utilized whenever possible (Novotny et al., 1993).

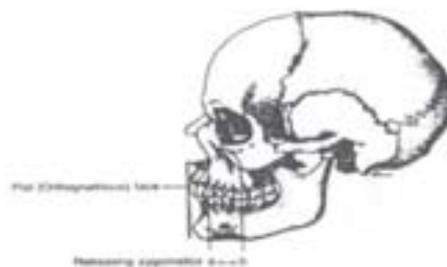
Kerley (1977) says that there is a great deal of variability with regard to prognathism among members of all major racial

groups. As a result of variations in prognathism, there are differences in the shape of the palate as well.

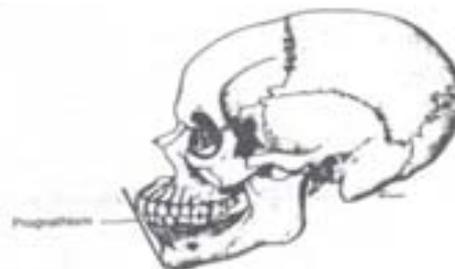
The Negroid face is usually marked by strong alveolar prognathism- a particular bulging of the jaws in the subnasal region. Mongoloid facial skeletons usually show some alveolar prognathism of both jaws, but not nearly also much as is usual in Negroid or Australoid skulls. Straight or orthognathous (having the front of the head, or the skulls, nearly perpendicular, not retreating backwards above the jaws) faces, devoid of prognathism, are most commonly diagnostic of Caucasoid (white) racial ancestry (Hooton, 1965) (Fig. 1a,b).

The skull of an Indian is Caucasian with a few Negroid characters (Modi, 1977).

Fig. 1: (a) Caucasoid skull



(b) Negroid skull



Materials and methods

60 Indian skulls of known sex (30 of either) were studied to assess the reliability level of metric studies vis-à-vis morphological indicators with respect to race determination with prognathism as sole criterion (applying both methods). The samples for the study were drawn from the collection maintained by the Departments of Anatomy and Forensic Medicine, Government Medical College, Patiala.

Indian skulls of known sex in which speno-occipital junction was synostosed and all required bony landmarks were intact were considered for study.

Prognathism

Prognathism refers to the anterior projection of the alveolar point relative to the nasion and basion (Glanville, 1969).

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Metric study

For the metric study of prognathism, the craniometric points (as detailed hereunder) were located on each cranium and series of measurements were taken between the points. These measurements were obtained with Spreading caliper to the nearest millimeter (mm), as per standard anthropological conventions and then Gnathic index was calculated.

Bony landmarks (photograph 1)

1. **Basion** : The point where the anterior margin of the foramen magnum is intersected by the mid-sagittal plane. The point is located on the inner border of the anterior margin of the foramen magnum directly opposite of Opisthion (the point at which mid-sagittal plane intersects the posterior margin of the foramen magnum) (Moore-Jansen et al., 1994).
2. **Nasion** : The intersection of the fronto-nasal suture and the median plane (Howells, 1973). This does not refer to the internasal suture in any way.
3. **Prosthion (Alveolar point)**: The most anterior-inferior point on the maxilla between the upper incisor teeth (El-Najjar and McWilliams, 1978).

Metric measurements

1. **Basion-nasion length: (Photograph 2)**
The direct length between nasion and basion (Howells, 1973).
With the skull base up, one end of the caliper was placed at nasion and the other end at basion and length was recorded.
2. **Basion-prosthion length: (Photograph 3)**
The direct distance from basion to prosthion (Moore-Jansen et al., 1994).
With the skull base up, one end of the caliper was fixed at prosthion and the other end at basion and length was recorded.
3. **Gnathic Index**

$$\frac{\text{Basion - prosthion length}}{\text{Basion - nasion length}} \times 100$$

(Breathnach, 1965)

Index above 103: Prognathous; 98-103: Mesognathous; below 98: Orthognathous

Non-metric study

Prognathism (Photograph 4)

Grades:
Small
Medium
Large (Larnach and Macintosh, 1966)

The grading was done following visual inspection and comparison with casts prepared and standardized by Australian National University.

The data so obtained both by metric and non-metric study, was tabulated and statistically analyzed.

Results and discussion

Metric study : Insert TABLE 1 here

Table 1: Metric study

Sex	Gnathic Index		
	Orthognathous	Mesognathous	Prognathous
Male	24	3	3
Female	26	3	1
Total	50	6	4

Table 2: Non-Metric study

Sex	Prognathism		
	Small	Medium	Large
Male	5	19	6
Female	11	15	4
Total	16	34	10

Non-Metric study : Insert TABLE 2 here

In the present study, Indian skulls were used. The skull of an Indian is Caucasian with a few Negroid characters, as stated by Modi in 1977. The most prominent feature of Caucasians is the completely straight profile (orthognathic profile) or the very prominent nose. There is generally rather little prognathism (Kerley, 1977). Thus, Indians have orthognathous jaws (with little prognathism).

The gnathic index below 98, indicates orthognathous jaws (Breathnach, 1965).

Table 1 showed that by Metric study of a total of 60 Indian skulls studied, 50 were found to have orthognathic profile (Gnathic Index below 98).

In the present non-metric study, casts prepared and standardized by Australian National University were used. Hooton in 1965, has mentioned that Australians (composite race) are characterized by medium to pronounced facial protrusion (prognathism) in comparison to Whites/ European/ Caucasoid (primary race) in whom facial protrusion/prognathism is usually lacking. As stated by Modi in 1977, that the skull of an Indian is Caucasian with few negroid characters. Thus, most of the Indian skulls should show 'Small' Grade prognathism using Australian standardized casts.

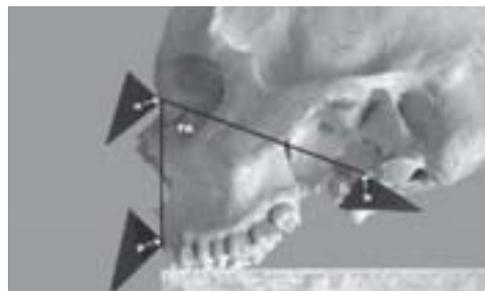
Table 2 shows that by Non-Metric study of a total of 60 Indian skulls studied, only 16 were found to have 'Small' Grade prognathism.

The Metric and Non-Metric data was statistically analyzed by Chi-square test. The value of χ^2 revealed ($\chi^2 = 38.922559$) that the difference between Metric and Non-Metric study is significant.

Thus, it can be stated from the present study that Metric study stands out as more reliable than Non-metric study at least with respect to race determination.

Many researchers have stressed the development of metric

Photograph 1: (b-basion; n-nasion; p-prosthion) (FA- Facial Angle)



Photograph 2: (BASION- NASION LENGTH)



Photograph 3: (BASION-PROSTHION LENGTH)



Photograph 4: (Australian standardized casts)



methods for race determination due to following reasons: (1) To obviate the need for experience as assessment from non-metric study improves with the experience and are accurate in the hands of expert only, (2) standardization of the methodology of scoring of non-metric traits also has significant role in modifying the end result, (3) lack of quantification of non-metric traits (quantification of trait means the frequency of occurrence of that trait in various populations).

The results of the present study support the fact that there is a need to develop Metric technique for race determination.

The race can be metrically determined by taking measurements and especially average measurements; ratio of two measurements; cranial, facial and mandibular indices; Discriminant function statistics.

Giles and Elliot in 1962, developed the first Discriminant function race formulae, but Birkby, in 1966 suggested that the Discriminant function analysis for race/ or sex determinations are not applicable to problems of human identification unless the crania are from populations on which these were established.

Gill et al. in 1984 found a reliable metric method by using simometer, useful in regions where Giles and Elliot technique was not very successful. Gill and Gilbert (1990) discovered that the formation of indices produces better results than discriminant function analysis. They were also easier to apply.

The present study has provided, in addition, a simple Metric technique for race determination, that is, estimation of Gnathic Index. Prognathism can be estimated by measuring Facial angle (**Photograph 1**). Thus, combination of Gnathic Index and measuring facial angle can serve as very useful guide for race determination

Acknowledgements

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Footnote

Composite Races – Races representing stabilized blends of two or more primary races. They present mosaics of features from the different racial stocks involved and usually occupy definite geographical areas where the blend has been stabilized in isolation. *Australian* – composite race (Archaic White + Tasmanian + recent minor fraction of Melanesian – Papuan).

A study on personal identification by lip print patterns in South Indian population

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Abstract

Identification of an individual is important in any medico legal matter or investigation. In the present study, the lip prints of 300 subjects [173 males and 127 females] belonging to south Indian population were studied by obtaining a thin smear of the prints and visualizing by the finger print powder (black). Individualistic nature and permanence of the lip prints was observed in the present study. Predominance of various types of lip print patterns in the four quadrants among the subjects are presented and evaluated. The results obtained by matching the prints obtained at follow up studies by using COREL-DRAW software has been excellent, which can be used to match the test prints with prints obtained at the scene of crime. The methodology used for recording and studying the prints is easy, economical and convenient. No specialized equipment or training is required to use this method. It was concluded in this study that no two individuals had same type of print patterns, even by considering the middle 5mm of each quadrant of the prints as evident from the study.

Introduction

Anthropometry, finger prints, and of late DNA finger printing have been used successfully in fixing the identity of a person in many cases as these are unique to every individual^{1,2,3,4}. Like these methods lip prints can be instrumental in identifying a person positively and can be used to verify the presence or absence of a person at the scene of crime^{4,5,6}. The wrinkles and grooves on labial mucosa, called sulci labiorum forms a characteristic pattern called as "LIP PRINTS" and the study of which is referred to as CHEILOSCOPY^{2,4,7}. Studies have shown that even lip print patterns are individual features which remain unchanged throughout one's life^{8,9,10}. Lip prints have a potential evidentiary value, which plays a prominent role in linking the criminal with the crime and also establishing identity of an individual¹. The practical use of lip prints in detection work shows that the trace of this kind carries a huge amount of precious information which can be used in the reconstruction of the event and identifying suspects⁹. Hence, the study of lip prints need to be developed so as to prove it as one of the easy, economical and useful tool for investigation, just like finger prints^{4,11,12}.

Material and methods

The materials required are

Skin care cream, a strip of paper 120mm long 45mm wide, transparent foil of adherent tape, magnifying lens, measuring scale, brush (Fingerprint brush/squirrel hair brush), View box, fingerprint dusting powder.

The study sample consisted of total 300 subjects [173 males and 127 females] in the age group of 18 – 22 yrs belonging to south Indian population. Subjects with cleft lip, any local disease or with fissures in their lips were excluded. The aim and objectives of the intended study were properly explained to the subjects in their vernacular language and informed written consent was taken in a proper proforma.

Institutional ethical committee approval was obtained for this study.

Recording of prints

The lips [washed and dried] of each individual were smeared with skin care cream evenly. After about 3 minutes, prints are taken on an ordinary paper with central portion of lips dabbed first and then pressing it uniformly to the left and right corners of lips. The lip print pattern so obtained was visualized by using finger print dusting powder and fixed with a transparent foil. The print pattern so acquired is studied carefully with a magnifying lens. The print patterns were divided into four quadrants and were analyzed quadrant wise. After six-months repeat lip prints were taken to look for any seasonal variation or change in pattern of the prints. Ridge count was done by recording the individual groove patterns from medial to lateral aspect in each quadrant

For classification, the lip print is divided into four quadrants by selecting a mid point and the pattern in each quadrant is labelled with a marker. Labelling of a particular pattern is based on the numerical predominance of types of grooves present.

1. I – Vertical complete – if the grooves are straight and extend through out the breadth of the lip.
2. I' - Vertical incomplete - If the grooves are straight but do not cover the entire breadth of the lip.
3. II - Bifurcated – towards occlusal margin
4. II' - Bifurcated – towards outer margin
5. III - Intersecting
6. IV - Reticular or
7. V - If the grooves do not fall into any of the type I to IV and cannot be differentiated morphologically.

This is based on Yasuo Tsuchihashi's classification⁸ except for type II', which is an addition in this study.

Follow up at 6 months interval

Samples of the lip prints of the same subjects were taken after an interval of 6 months. The prints obtained at follow up was compared with the respective previous prints to check for any change in the pattern of the lip prints by using a software called COREL DRAW by superimposition photography.

Method of comparison of lip prints

Scanner used - UMAX2000, Sharpness 100%, Resolution 300 dpi

Software used – COREL DRAW.

The prints obtained initially (I set) is saved as "JPEG" images and the prints obtained subsequently at the interval of 6 months (II set) is saved as "GIF" transparency images with the help of scanner. The images so obtained are subjected for comparison.

Manual comparison

The prints from I set and II set of the same individual were taken in same frame and compared manually looking for at least 10 features using magnifying lens.

Super imposition

The prints from I set and II set are magnified to same frame. GIF images are overlapped on the JPEG images. Both

Table 1: Pattern predominance

	QuadrantsN=1114*	Malen=628	Femalen=486	Male %	Female %
Type I	First quadrant	37	21	17.8	16
	Second quadrant	34	20		
	Third quadrant	17	22		
	Fourth quadrant	24	15		
Type I ¹	First quadrant	05	04	4.6	2.8
	Second quadrant	12	05		
	Third quadrant	06	04		
	Fourth quadrant	06	01		
Type II	First quadrant	11	08	7	6.4
	Second quadrant	18	07		
	Third quadrant	12	08		
	Fourth quadrant	03	08		
Type II ¹	First quadrant	30	28	28.3	29.2
	Second quadrant	29	26		
	Third quadrant	64	42		
	Fourth quadrant	55	46		
Type III	First quadrant	29	13	21.3	16
	Second quadrant	34	22		
	Third quadrant	35	23		
	Fourth quadrant	36	20		
Type IV	First quadrant	37	43	14.8	22.8
	Second quadrant	22	32		
	Third quadrant	12	15		
	Fourth quadrant	22	21		
Type V	First quadrant	08	07	6	6.6
	Second quadrant	13	11		
	Third quadrant	09	07		
	Fourth quadrant	08	07		

the images are matched considering few selected primary grooves in the prints. Here initially few primary grooves are selected on both the prints. The prints are then superimposed considering primary grooves selected. All the grooves, contours of lips, margins and relative measurements are tallied.

Results and observation

*each subject's prints divided into 4 quadrants, hence $n=300 \times 4 \times 86=1114$ (86 is the number of quadrants with smudged prints).

Table 1 shows the descriptive statistics of lip print patterns in the four quadrants

In the present study it was noted that, [table. No.1] type I (190) is more common in the upper lip (112) especially in males where as Type II¹ (320) is seen more commonly in lower lip (207) especially in males. The combination of lip prints quadrant wise of each individual was unique.

Table II shows the statistics of predominance of various lip print patterns among the subjects

Type II¹ was most predominant which is seen in 28.7% of subjects whereas type I¹ was least common which is seen in just 3.8% of subjects.

Type I, III, and IV was seen on an average of 18.1% of subjects whereas types II and V on an average of 6.4% of subjects.

Table2 : Showing percentage distribution of types among subjects

Patterns	Percentage
Type I	17
Type I ¹	03.8
Type II	06.7
Type II ¹	28.7
Type III	19
Type IV	18.3
Type V	06.2

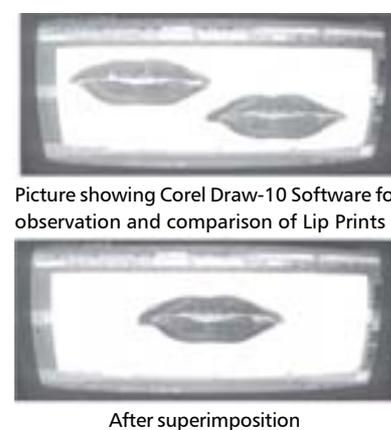
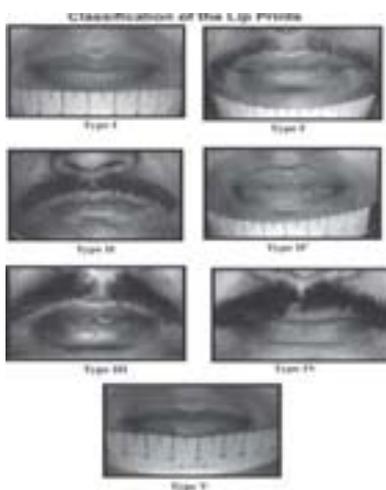
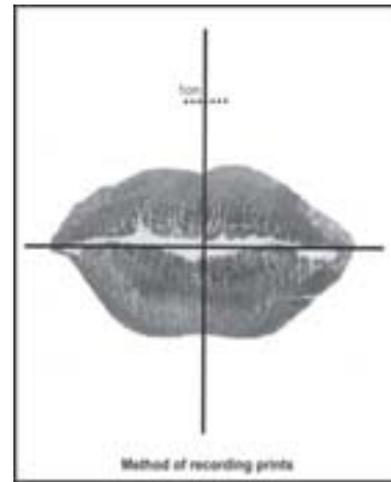
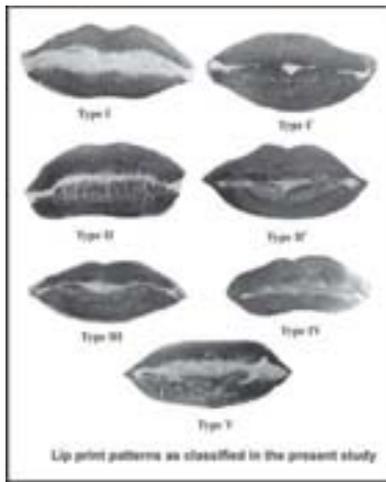
Discussion

The study of lip print patterns from 300 [173 males and 127 female] inhabitants of south India revealed that,

- No two lip prints matched with each other in the present study which is consistent with previous studies published in literature^{1,2,3,4,10}. Thus establishing the uniqueness of the lip prints and thereby being a potential identification feature of an individual.
- Most common pattern of lip prints in both males and females was the Y-shaped, with the branching towards the outer margin of the lips (type II¹-28.7%). This is in contrast to the study done by Sivapathasundaram et.al. and study done by Yasuo Tsuchihashi et,al which shows that type III is commonest
- The least common variety being the undetermined types (type V-6.2%) which could not be classified into any other type of lip print patterns. This is consistent with study done by Sivapathasundaram et.al. and Yasuo Tsuchihashi et,al
- Furthermore to check the permanent nature of the print patterns, superimposition technique has been used with the help of COREL DRAW soft ware. This can also be used for comparison of the prints at the scene of crime with that of the suspect, since prints of any two people cannot be matched. It was confirmed that the labial wrinkles and grooves of each of the individual do not have seasonal variation and were identical with the one taken 6 months earlier.
- Previous studies have not considered the ridge count as an identification feature. This present study has attempted to trace the ridge count differences between individuals in a particular pre selected segment of the prints which can add up to the individualistic features of the lip prints.

Conclusion

This study has been taken to broaden the horizon of lip



prints in the form of ridge count and highlight this particular methodology that can be used to establish the identity, considering particular segment of the prints like that of finger prints. This study shows that lip prints are unique to an individual and no two prints had same patterns in the selected segment. It was concluded that the labial wrinkles and grooves of the individual do not show any seasonal variation and were identical with the earlier print. The ridge count, recording of individual groove patterns and superimposition technique has confirmed the individual unchanging characteristic of the lip prints, and thereby being a potential identification tool. We recommend that further studies with wider samples of other regions of India should be conducted.

This study has confirmed that lip prints are unique to an individual like that of fingerprints and there are no appreciable changes seen in the lip prints due to change in seasons.

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Study of changes in serum electrolytes and acetyl cholinesterase in acute organophosphate insecticides poisoning at Davangere, Karnataka

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Abstract

The Organophosphate compounds are the main weapons against insect and of importance in agriculture, public hygiene and medicine. Since organophosphates are widely used and they are known to pose risks of acute and chronic toxicity to both humans and wildlife, it is important to monitor exposure to them. So, an attempt is made to study the effects of serum electrolytes in accidental heavy dose Organophosphates toxicity in humans and correlation of acetyl cholinesterase with severity of the patients.

Keywords

Organophosphates, acetyl cholinesterase, serum electrolyte

Introduction

Organophosphates are commonly used as insecticides in agriculture in India and are potent toxicants ⁽¹⁾.

A serious problem with some Organophosphate compounds has been their high acute toxicity to man and non-target organisms ⁽²⁾ and due to increasing stress and strain in today's modern life people have become more susceptible to suicide.

The incidence of poisoning is constantly increasing in all civilized countries. The type of poison used depends upon educational, economical status of the people and accessibility of the poison. Now these Organic insecticides are common agents used for accidental and suicidal poisoning due to their ready availability and easy accessibility.

W.H.O. estimate suggests that more than 3 million cases of acute poisoning occur worldwide annually, the majority being caused by organophosphates. In India also, organic insecticide poisoning is a major cause of morbidity and mortality and accounts for a large proportion of patients admitted to I.C.U. ⁽³⁾

These insecticides inhibit cholinesterase (ChE) activity in the nervous tissues and neuromuscular junctions, causing an accumulation of acetylcholine at the nerve endings which subsequently produces signs of toxicosis characterized by nicotinic, muscarinic, and central nervous system effects.

Most of the ill-health following exposure to Organophosphate compounds has been attributed to the inhibition of cholinesterase. It is becoming apparent that, although inhibition of cholinesterase plays a key role in the toxicology of organophosphates, individual susceptibility, the inhibition of other enzyme systems and the direct effects of organophosphates on tissues and effects on serum electrolytes are also important. ⁽⁴⁾

Several Organophosphate have been extensively studied as geno toxic agents in mammalian in vivo systems but there is limited information on their effect on individual cells and serum electrolytes. Electrolyte determinations now constitute one of the most frequently requested groups of analyses performed by clinical laboratories. They have a place in specific diagnosis, in the judgment of therapeutic measures, and as a general screening procedure. For such widely requested tests it is very important that both clinician and laboratory analyst

should be aware of the normal range of values and the significance of variations in results. ⁽⁵⁾

The present study aims at investigating changes in biochemical parameters such as serum electrolyte and cholinesterase due to acute lethal poisoning caused by the oral consumption of organophosphorous insecticides.

Aims and objectives of study

1. To Study the Serum Electrolytes changes (Na⁺, K⁺ and Cl⁻ levels) in Humans with Organophosphate insecticide poisoning.
2. To estimate the levels of cholinesterase activity in Organophosphate insecticide poisoning.

Materials and methods

STUDY TYPE:	Open Label prospective comparative study
STUDY POPULATION:	Patients admitted with insecticide poisoning.
STUDY CENTER:	S.S.Institute medical sciences and research centre, Davangere
METHODOLOGY:	Total numbers of cases studies were 35

Samples were collected from patients diagnosed with insecticide poisoning admitted to S.S.Institute of medical sciences .Davangere.

Informed consent was taken from patients / relatives before the procedure.

1. From these collected blood samples, the research investigation was carried out for estimation of serum electrolytes and levels of cholinesterase activity.
2. Auto Analyzer method was used for estimation of serum electrolytes
3. Kinetic Method (using R1 buffer solution & R2 kit) was used for estimation of levels of cholinesterase activity.

Procedures used for estimation of serum electrolyte and cholinesterase levels:

Estimation of serum electrolytes

2ml of blood was collected from the patients and was centrifuged to separate the serum. ...of the serum of used and it is fed to auto analyser for estimation of serum electrolytes.

Estimation of cholinesterase

Cholinesterases kit was used. It was stored at 2-8^o c. the kit contained R1 buffer solution and R 2.

Both 20 micro litre of patient serum and 20 micro litre of prepared solution were mixed and fed to cholinesterase analyser. It gives the results using kinetic method.

Prepared solution

It is obtained by dissolving single table present in R 2 with R 1 Buffer

Normal levels ⁽⁶⁾

The following levels were taken as normal levels for the study	
Serum Sodium:	135-145 mmol/l
Serum Potassium:	3.5-5.5mmol/l
Serum Chloride:	100-105mmol.l
Cholinesterases:	4000-10000 IU/L.

Inclusive criteria

1. All the patients diagnosed with Organophosphate insecticide compound poisoning admitted to S.S.Institute of medical sciences. Davangere.

Exclusive criteria

1. Patients other than insecticide compound poisoning were excluded.
2. Patients of Organophosphate insecticide with pre-existing renal disorder.

Results

Table 1: Study Population according concentration of chloride levels

Sl no	Number of patients	Chloride levels (mmol/L)	Percentage
1	03	Less than 100	8.57%
2	08	101-105	22.85%
3	24	More than 105	68.57%
TOTAL	35		

Table 2: Study Population according concentration of potassium levels

Sl no	Number of patients	Sodium levels (mmol/L)	Percentage
1	03	Less than 3.5	8.57%
2	21	3.5-5.5	60%
3	11	More than 5.5	31.42%
TOTAL	35		

Table 3: Study Population according concentration of sodium

Sl no	Number of patients	Sodium levels (mmol/L)	Percentage
1	15	Less than 135	42.85%
2	16	135-145	45.71%
3	02	More than 145	5.71%
TOTAL	35		

Table 4: Study Population according concentration of cholinesterase levels

Sl no	Number of patients	Sodium levels (IU/L)	Percentage
1	08	Less than 500	22.85%
2	18	501-1000	51.42%
3	01	1001-2000	2.85%
4	03	2001-3000	8.57%
5	01	3001-4000	2.85%
6	02	4001-5000	5.71%
total	35		

Discussion

Organophosphate insecticides are an important cause of poisonings. Organophosphate compounds are commonly used as agricultural insecticides. Thus, acute organophosphate pesticide (OP) poisoning is widespread in developing countries. Organophosphate compounds inhibit acetyl cholinesterase (AChE) irreversibly and lead to accumulation of acetylcholine at synapses and plasma. It also causes changes in the serum electrolytes. Therefore the Treatment of OP poisonings consists of supportive care, especially aimed at respiratory complications and specific antidotal therapy including atropine (as an anticholinergic agent) and oximes (as cholinesterase reactivators), such as pralidoxime and obidoxime, but they have failed to

improve the outcomes in some cases. (7)

The duration of treatment depends both on the improvement of clinical signs, normalization of serum electrolytes and increase in the cholinesterase levels. Serum cholinesterase activity appears to be a reasonable index to evaluate clinical recovery in most instances. If serum cholinesterase levels do not gradually increase, these patients may have a poor prognosis. To achieve an adequate cholinesterase level, cholinesterase reactivators are frequently used, but these agents may be ineffective in some patients. It is said that 20–30% decrease in serum or plasma ChE activity usually suggests exposure to anti-ChE compounds. Inhibition of blood ChE activity by more than 50% supports the diagnosis of poisoning and indicates poor prognosis. (2)

In the present study it was observed that in 26 cases (74.28%) the ChE level was severely reduced. The level of cholinesterase was found to be between 500-1000 IU in 18 cases (51.42%) and in 8 cases (22.85%) the cholinesterase level was below 500 IU. The chloride level was found to be elevated in 24 cases (68.57%). Elevations in chloride may be attributed to diarrhoea, kidney disorder caused after the consumption of Organophosphorus insecticide and it may also be due to chlorine content of the insecticides (Organochlorines). It was also observed that low sodium levels were noticed in (42.85%) 15 cases, this can be caused due to excessive perspiration, intoxication and impairment of adrenal and kidney function. The level of potassium was found to be slightly elevated in 21 of the cases (60%). This may be due to the fact that the Organophosphates consumption leads to the damage of cells by which the potassium is released out of the cells (1)

Conclusion

The present study reveals that there are significant changes in the serum enzymes and serum electrolytes changes due to Organophosphate toxicity. These changes are helpful in the assessment of severity, and prognosis of the patients. Although the toxicity profile differs for each individual due to the fact that various factors such as dosage taken, nutrition status of the individual, patient's past history, etc will aggravate the profile and may be proved to be fatal.

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Burns and burning issue

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Absrtact

Deaths due to burns though rare in the western context are frequently encountered in the Indian scenario. A study was conducted at Government General Hospital Gulbarga over a period of five years to find out the incidence and influence of different factors leading to fatal burns injury. Out of the total 525 cases studied maximum were found in the age group of 20-30 years. 115 patients were brought dead and the remaining 410 succumbed later after the admission. Among these 161 cases survived for five days after the injury. Most common cause of death in our study was septicemia which accounted for 343 cases. Maximum number of deaths i.e., 450 was accidental in nature and least common was homicidal deaths accounting for only 23 cases. The paper also describes the comparison between our study and studies conducted by different authors across the country to find out the similarities and dissimilarities in various factors affecting the burns victims.

Key words

Burns; Death; Society;

Introduction

Thermal burns are more common causes of unnatural deaths. Incidence of death due to burns stands next to road traffic accidents in India. Social evils like dowry deaths also contribute significantly to the number of deaths by burns. On an average 1/4th of the deaths constitute death due to burns among all postmortem examinations conducted. Mortality rate due to burns is much more in India than any other developed countries.

Considering the magnitude of the problem, this study was conducted to know the incidence rate as well as influence of various factors on burns cases in this part of the country.

Material and methodology

The present study was conducted over a period of 5 years from January 1998 to December 2002 at Mortuary, Government General Hospital, Gulbarga. Information was collected from relatives / friends/ neighbours at the time of occurrence of the incident, inquest report and relevant documents.

Information from case history papers and relevant hospital documents of the victims, along with the autopsy findings, were tabulated and statistically analysed.

Results

Table 1: Incidence of Burns.

Year	Autopsy in case of burns
1998	106
1999	096
2000	121
2001	105
2002	97
Total	525

Table 2: age wise distribution

Age group	No. of cases
Upto 10 years	33
10-20 years	123
20-30 years	235
30-40 years	74
40-50 Years	32
50-60 Years	22
60 and above	06
Total	525

Table 3: Sex wise distribution

Year	Male	Female	Total
1998	26	80	106
1999	20	76	96
2000	31	90	121
2001	32	73	105
2002	35	62	97
Total	144	381	525

Table 4: Hospital deaths Vs Brought dead.

Year	Brought dead	Hospital death	Total
1998	20	86	106
1999	9	87	96
2000	57	64	121
2001	19	86	105
2002	10	87	97

Table 5: Period of survival.

Period of survival	No. of cases
Upto 12 hours	91
1 st day	102
2 nd day	80
3 rd day	27
4 th day	64
5 th day	161
Total	525

Table no. 6: Cause of death.

Cause	No. of cases
Neurogenic	14
Hypovilemic	113
Toxicemic	55
Septicemia	343
Total	525

Table 7: Manner of death.

	1998	1999	2000	2001	2002	Total
Accidental	94	83	104	88	81	450
Suicidal	9	8	12	12	11	52
Homicidal	3	5	5	5	5	23
Total	106	96	121	105	97	525

Discussion

The result / information obtained is compared with the studies conducted in different parts of our country.

Incidence

The incidence of death due to burns is 25.41% which is the second commonest cause of death next to road traffic accidents in the present study. This finding is comparable with the other studies done by V.N. Ambade¹ Rao.N.G² in which the incidence was 21.6% and 22.73% respectively.

Age

Maximum number of deaths i.e., 44.84% occurred during this study. In the age group 21-30 years, and second highest deaths occurred in age group of 11-20 years. Incidence of death in the age group above 61 years was minimum i.e., 8 cases and 43 cases were children under 10 years. Mohanty MK et al³ observed that majority of deaths (46%) occurred in 21-30 years of ages group. Ambade VN et al¹ in a study on trends of burn deaths it was found that most of the victims were between 11-40 years with peak at 21-30 years (47.1%).

So, the present series is in accordance with the above studies.

Sex distribution

Females outnumbered males by about 3-times i.e., the incidences being 73.20% in females and 26.80% in males. In fact by close observation more number of deaths occurred in the young females in the age group 15-30 years. This study clearly depicts the magnitude of the problem in young females, particularly in the early married life. Mohanty MK et al³ in a study on death by burning found that female preponderance was more with 79.5%. Ambade VN et al¹ observed female predominance (74.2%) in burning with male-female ratio equal to 1:2.9. Ashish K. Jaiswal⁴ found that the incidences was more in females as an absolute number (70.3%). Mago V⁵ found that female outnumbered males with a ratio of 1.17:1.

So, the present study is in consistent with the above studies conducted by Mohanty³, Ambades¹, Ashish⁴ and Mago⁵

Place of death

The cases brought dead includes the cases which either dies just before admission and treatment or those who died on the spot, died in other hospitals, nursing homes and brought dead directly to the mortuary. Apart from the cases brought dead directly to the mortuary for above said reasons, the other major contributing factors being lack of transportation facilities, illiteracy, awareness are among the major contributions to brought dead cases.

The hospital deaths and brought dead ratio is 3:1 approximately.

Period of survival

Period of survival is directly related to surface area of body involved in burns. In this study maximum number of cases survived for more than 5 days period i.e., 214 cases (30.66%). In a study, Jairama et al⁶ showed that maximum survival period was less than 5 days i.e., in 91% cases. Dalbir Singh⁷ found that in 86% cases, period of survival was within one week.

The analysis made by Jairaman⁶ and Dalbirsingh⁷ and the present study's duration of survival is approximately 5 days, which is coherent.

Cause of death

The findings of the present series noting the sepsis as the most important factor for the cause of death, as the period of survival in maximum number of cases is more than 5 days. In the present study, out of 698 cases, maximum deaths i.e., 65.54% were due to septicemic shock and minimum i.e., 2.57% were due to Neurogena shock.

This is because lot of the victims of burns, who survived the initial 24 hours after burns, succumb to infection of the burnt area and its complications. Burns cause devitalization of tissue leaving extensive raw areas, which usually remain moist due to the outflow of serous exudate. The exposed moist area along with the dead and devitalized tissue provides the optimum environment favoring colonization and proliferation of numerous microorganisms, which is further enhanced by the depression of the immune response. All these factors contribute towards sepsis in a burns victim.⁸

Tripathi CB et al⁹ found 3.92% death due to septicemia, while Nageshkumar Rao² found that 53% of cases died due to septicemia.

Manner of death

Maximum death were due to accidental burns (85.67%), followed by suicidal burns (9.89%) and the minimum number of cases were of homicidal burns (4.44%).

But the above facts remain controversial, when we actually looked into the real history and circumstantial evidences. History in such cases was debatable, because of common age group and allegations of dowry deaths.

In many cases of alleged suicide and accidental deaths, when questions were put to the relatives or the attendants of deceased, a hostile attitude was often noticed which arouse suspicion of foul play.

In some of these cases, the fact is that the relatives of the deceased were forced to give false account of cause of death, to make it appear accidental though in all probability a clear case of suicide.

Further highly selective factors, such as socioeconomic conditions, domestic quarrels, disturbed domestic life, chronic disease, mental disorder, disappointment in love or failure in examination etc, may determine the number of suicidal cases.

Conclusion

Accidental burns are mostly preventable by adequate safety measures and safety education. "Bride burning" is a social evil unmatched in its cruelty and cynicism in today's civilized society. Any discussion on its etiopathogenesis and remedial measures must take into account the socio-cultural and economic ramifications underlying this scourge. Legal measures however, harsh or deterrent, cannot suffice to combat this scourge due to complete dependence of the woman on her husband and in-laws. There is a need for more stringent laws for possession and use of explosive and inclusive and inflammable, materials to prevent accidents.

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Evaluation of dowry deaths in Bangalore city in two years period

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Abstract

The present modern day culture still has the ancient evils of civilization. In spite of the increase in educational status of most parts of the country, dowry related harassments and deaths are on the rise with every coming year. The objectives of my study are to find out the incidence, cause and mode of death in the victims dowry harassment, to study their educational and occupational status. The present study was conducted at Dept. of Forensic medicine, Victoria Hospital, Bangalore, on all married women dying within 7 years of married life, booked under section 304(B), 306, 498(A), 302IPC & 176CrPC, in cases where inquest was conducted by executive magistrate.

From the present study, alleged dowry death cases constitute 4.06% of total autopsies and 11.74% of female autopsies. Most of the dowry deaths occur in Hindu families and burning is the most common mode of dowry death. Most of the victims were of below matriculate, house wives. The menace of dowry harassment and deaths cannot be tackled with legislation alone; it needs socioeconomic and educational reforms.

Keywords

Dowry death, Bride burning, Harassment, Autopsy.

Introduction

Dowry death is a burning issue of society in the past, at present and also in the future. The dowry related harassments and deaths are increasing day by day due to prevailing socio-economic fabric and life style. The dowry and dowry related deaths are such evils, which are putting the modern society in to great shame. These problems have thrown a major challenge to the investigating officers, medico-legal experts, as well as to judicial officers, not only to wipe out this social menace but also to penalize interprets in deterrent manner. Despite of best efforts of making dowry prohibition laws more stringent by repeatedly amending them, the society is still sinking in the deep mire of dowry.

An interesting feature of these crimes is that, in the majority of cases of bride killing, the trouble is created by female themselves against their own sex. So dowry related crime is normally abetted and even committed by the females themselves. The dowry is closely interlinked to many crimes committed against women, viz. female infanticide, domestic violence, rape, neglect of the girl child, denial of educational and career opportunities to daughters and gender discrimination against women. Dowry death or suicides by married women as a result of their being subjected to cruelty by in-laws and/or husband constitutes a slur on the Hindu society.

In alleged dowry related crimes, difficulties arise because of failure to distinguish between what is dowry or not a dowry. The demands for dowry verge on extortions and these demands may not cease on the completion of marriage, as post marriage demands are real causes in dowry related deaths. The legislation cannot by itself solve this deep-rooted social problems; one has to approach them in other ways too. In these crimes

investigating officer plays a vital role, as his duty is not only to identify the real culprits and give justice to the deceased but also to safe guard the husband and /or in-laws, if at all they are innocent and are falsely being implicated by parents or the relatives of the deceased. These dowry cases are specially investigated under the supervision of executive magistrate and most of these cases need medical / forensic evidence to establish that the death is not suicidal but homicidal in nature. Thus forensic experts play a very important role in investigation of dowry death cases, as the circumstances and events that lead to dowry death-occur more often in privacy and familial secrecy and it is not so easy to collect independent and direct evidence.

In Bangalore, one or the other dowry related crimes appear in daily news. Statistics reveal numerous cases of married women being harassed / tortured, murdered, burnt and even forced to commit suicide on account of the evils of dowry. Bangalore city alone has the dubious distinction of accounting for more than 26.3% of dowry death cases reported every year in Karnataka. This study was undertaken to evaluate the incidence, mode and manner of alleged dowry deaths in Bangalore city and educational & occupational status of victims.

Objectives

- The present study was undertaken to study:
1. The incidence, mode, manner of alleged dowry deaths in Bangalore City.
 2. The incidence in relation to the educational & employment status of victims.

Materials and methods

The subject and material for the present study was taken from the autopsies conducted on the victims of alleged dowry death cases at Victoria Hospital mortuary attached to Bangalore Medical College, Bangalore-02, in two years period from November 2003 to October 2005. The cases were brought by polices of various police stations of Bangalore city, whose inquests were conducted by executive magistrate. A total of 6671 autopsies have been conducted at Victoria hospital during the present study period, among them a total of 271 cases of alleged dowry death cases have been studied and the study design was a cross-sectional study.

Inclusion criteria:

- 1) All the dead bodies of married women dying within 7 years of married life, brought to the Victoria Hospital mortuary, cases have been booked under section 304(B), 306, 498(A) IPC and 176n Cr.PC. whose inquest is conducted by executive magistrate.
- 2) All the cases of homicide of the women within the 7 years of married life, cases booked under section 302 IPC, whose inquest was conducted by police inspector.

Exclusion criteria:

- 1) Death of married women due to road traffic accidents, snake bite, natural calamities and natural causes.
- 2) The cases of alleged dowry deaths occurring in Bangalore City during the same study period but autopsy conducted at other centers.

The information regarding the cases of alleged dowry deaths was obtained from Investigating officer and F.I.R report,

Magistrate inquest, Dying declaration and Suicide notes when available, Interviewing the parties of both sides (Parents & In-laws), Post mortem examination findings.

Result

During the study period of two years from Nov-2003 to Oct-2005, a total of 6671 autopsies were conducted at Victoria Hospital Mortuary attached to Bangalore Medical College. Out of these 2309 (34.61%) were the total female autopsies, among these 1800 (77.95%) autopsies were on the bodies of married women. Out of these 1800 cases of married women, 585(32.5%) women died within 7 years of married life. Out of these 585 bodies of women dying within 7 years of marriage, 271(46.32%) cases have strong history and corroborative findings of involvement of matter of dowry as a motive of death (Alleged dowry Deaths). We have studied these cases of alleged dowry deaths in detail. These total 271 cases of alleged dowry death constitute 4.06% of total autopsies, 11.74% of female autopsies and 15.05% of married female autopsies conducted at Victoria Hospital mortuary during the study period.

With regard to mode of death(table-1), the burns constitute the maximum number of dowry death i.e. 171(63.1%) cases out of total 271 cases of alleged dowry deaths, followed by hanging 71(26.2%) cases, poisoning 18(6.6%) cases, drowning 4(1.47%) cases and others 7(2.58%) which include 3 cases of throttling, 2 cases of ligature strangulation, 1 case of stab injury to abdomen and another 1 case of head injury with wooden club. As the burning was the prime mode of death which accounted for 171(63.10%) cases out of total 271 cases, hence special efforts have been put to study the burns cases in detail. Out of 2309 case of total female autopsies, 1246(53.96%) cases of females were died due to burns. Among these 1246 cases of female death due to burns 1010(81.06%) were married women, only 236(18.94%) cases were the unmarried females. Out of 2309 cases of total female autopsies 383(16.59%) cases of women died due to burns within 7 years of married life and in 171(7.41%) cases there was a strong history and involvement of dowry matter as a leading cause for burns and death.

With regard to manner of death (table-3), the suicides constitute maximum number of alleged dowry deaths i.e., 150 cases (55.4%) and homicides constitute 121(44.6%) cases. Out of 171 cases of alleged dowry deaths due to burns, homicidal deaths constitute 112(65.5%) cases, suicide constitute 59(34.5%) cases. Out of total 71 cases of alleged dowry deaths due to hanging, 69(97.1%) cases were suicidal hanging and 2(2.8%)cases are due to homicidal hanging. All 18 poisoning cases and 4 drowning cases were suicidal in nature and other 7 cases (of throttling, ligature strangulation, stabbing and head injury) were homicidal in nature.

In relation to the educational status of the victims(table-3), out of 271 cases of dowry deaths, the education level of most of the victims was below matriculation i.e. 173(63.84%) cases. In these 54(19.93%) cases belong to brides who were illiterate, 119 cases (43.91%) cases were non-matriculates, followed by 91 (33.57%) cases who are matriculate and above but non-degree holders, 7(2.58%) were degree holder among which only 1(0.37%) case was of post graduate degree holder. In relation to occupational status of the victims (table-4), out of 271 cases of dowry deaths maximum cases recorded i.e. 241(88.93%) cases of victims were house wives, 24(8.86%) cases were private sector employees, and 4(1.47%) cases were students and only 2(0.74%) cases were government employees.

Discussion

In recent times, the issue related to women have been raised and discussed at various fora. Among these issues the

'crimes against women' have occupied the centre stage. The fact that a dozen and more cases of crime against women are registered daily while many more such cases undoubtedly go unreported. Among these crimes against the women 'Dowry related deaths and harassment' is most heinous one. Dowry death is a burning day to day problem of the society and incidence is quite common in Bangalore city. Dowry occupies only one end of broad spectrum of social abuse against women, within the same spectrum are humiliation, cruelty, punishment, molestation, physical or mental torture or any thing, which enforces a lady helpless, consequent to dowry related unending demands of the husband and in-laws. Hence there is no denial that there is an ever increasing crime against women at the hands of their husband and/ or in-laws. During our present study period 6671 were the total autopsies conducted, out of which 34.61% were the total female autopsies. Among these female autopsies, 77.95% were deaths of married women, out of which 32.5% were the married women died within seven years of married life. Out of these 271 (46.32%) were the alleged dowry deaths. These observation made in this study are more or less similar to that seen in other part of the country. Sharma et al⁴ where they conducted 1651 medico legal autopsies, 33% were females, of whom 68% were the married women and according to Bhullar¹⁰ out of total female autopsies, 74.29% were married female victims. The findings in our study indicate that, there is significant amount of atrocities on married women.

Incidence of dowry death in each year of present two year study remains almost same i.e., 135 cases in 1st year, 136 cases in 2nd year (Table No.1), in comparison to Agnihotri Study⁵ the incidence of dowry deaths are steadily increasing with time. This indicates that even with stringent anti dowry laws, the incidence of dowry death remains significant and hence these dowry related crimes cannot be curbed with law alone, they need tackling by other means too. Regarding the causative agents (modes) of dowry deaths such as burns, hanging, poisoning, drowning etc. the majority of dowry deaths are due to burns (63.10%), followed by hanging (26.20%), poisoning (6.64%) and drowning (1.48%). These findings are comparable to other previous similar studies conducted by Nagesh Kumar⁹ where 63.3% of dowry deaths were due to burns, Bhullar¹⁰ where burns constituted 70% of total dowry deaths and Agnihotri⁶ study in which burns constituted 67.55% of total alleged dowry deaths and also satpathy.⁸ But in our study hanging is 2nd commonest, 26.2% cases as against 1.99% cases in study done by Sharma et al⁴. In Agnihotri⁶ and Bhullar¹⁰ studies, the poisoning being 2nd commonest mode i.e. 14.57% and 15.71% cases respectively. But other modes of death like, strangulation, throttling and stabbing etc. constituted 2.6% cases of alleged dowry deaths.

With relevance to manner of death like homicide or suicide, out of 271 cases of alleged dowry deaths, more than half of total cases are of suicidal in nature i.e. 55.4% and 44.06% cases are of homicidal deaths, as compared to Agnihotri study⁶ where about 78% cases were found to be homicidal in nature and remaining 22% were suicidal deaths. In our study 65.5% of burns cases, 2.8% of hanging and 100% of other cases are homicidal. Where as 34.5%cases of burns, 97.1%cases of hanging and all cases of poisoning and drowning deaths are suicidal. The more cases of burns are homicidal because, victims are harassed and assaulted by other means and were killed by burns just to conceal the crime.

In relevance to educational status of the victims most of the cases were below matriculate 63.84%, followed by matriculate in 33.58% cases only 3.58% victims were graduates. These findings corresponds to other studies in this field viz. Bhullar¹⁰ who reports more number of alleged dowry deaths in illiterate, under metric or matriculate only and also in Agnihotri study⁶ where majority of dowry deaths i.e.96% of victims were reported in ladies who were either illiterate, below

Table 1: Month Wise Distribution of Alleged Dowry Deaths Cases During Nov 2003 to Oct 2005

Sl. No	Month	Total Autopsies	Total Female Autopsies	Married Female Autopsies	<7 years of Marriage	Alleged Dowry Deaths	Mode of Death				
							Burns	Hanging	Poisoning	Drowning	Others
1	Nov 2003	241	100	75	21	14	9	5	0	0	0
2	Dec 2003	315	85	63	18	10	7	3	0	0	0
3	Jan 2004	246	96	82	27	15	7	5	2	0	1
4	Feb 2004	254	105	75	23	11	6	3	2	0	0
5	Mar 2004	284	104	79	33	13	8	3	1	0	1
6	Apr 2004	365	106	76	34	16	7	6	2	1	0
7	May 2004	277	85	64	27	12	9	3	0	0	0
8	Jun 2004	266	92	71	26	9	5	3	0	0	1
9	Jul 2004	261	96	75	19	9	3	4	1	1	0
10	Aug 2004	245	87	61	18	7	4	1	1	0	1
11	Sep 2004	284	101	83	21	9	5	4	0	0	0
12	Oct 2004	254	88	74	28	10	8	1	0	0	1
13	Nov 2004	240	80	64	16	7	4	2	0	0	1
14	Dec 2004	290	90	69	21	9	5	2	2	0	0
15	Jan 2005	285	108	86	30	12	9	2	0	1	0
16	Feb 2005	262	93	69	24	13	10	2	1	0	0
17	Mar 2005	282	101	84	37	18	12	3	3	0	0
18	Apr 2005	297	99	79	19	13	11	2	0	0	0
19	May 2005	341	116	96	29	11	5	4	1	0	1
20	Jun 2005	267	81	68	23	11	8	2	1	0	0
21	Jul 2005	268	95	71	14	8	4	2	1	1	0
22	Aug 2005	272	91	75	27	11	8	3	0	0	0
23	Sep 2005	295	108	77	26	11	9	2	0	0	0
24	Oct 2005	280	102	84	24	12	8	4	0	0	0
	Total	6671	2309	1800	585	271	171	71	18	4	7
						%	63.10	26.20	6.64	1.48	2.58

Table 2 : Mode and Manner of dowry deaths

Sl. No.	Mode of Death	Manner of Death				Total	
		Homicide		Suicide		No.	%
		No.	%	No.	%		
1	Burning	112	65.5	59	34.5	171	63.1
2	Hanging	2	2.8	69	97.1	71	26.2
3	Poisoning	0	0	18	100	18	6.6
4	Drowning	0	0	4	100	4	1.5
5	Others*	7	100	0	0	7	2.6
	Total	121	44.60	150	55.40	271	100

*Others-Throttling, Ligature Strangulation, Stabbing and Head injury.

Table 3: Occurrence of dowry death in relation with educational status

Sl. No.	Educational Status . of the victims	Dowry Deaths	
		No.	%
1	Illiterate	54	19.93
2	Non Metric	119	43.91
3	Matriculate	91	33.58
4	Graduate	6	2.21
5	Post Graduate	1	0.37
	Total	271	100

Table 4: Occurrence of dowry death in relation with occupational status of the victims

Sl. No.	Occupational Status	Dowry Deaths	
		No.	%
1	House wife	241	88.93
2	Private Sector Employee	24	8.86
3	Government Employee	2	0.74
4	Student	4	1.47
	Total	271	100

metric or matriculate and only 3.97% victims were educationally highly qualified. This suggest that highly educated women can opt for employment and can earn handsomely, so have economical independence, and have better understanding and analysis of the situation at husband house, and most of them will be having knowledge regarding rites of women and laws which are in protection of women and hence are minimally involved in incidences of dowry related deaths and harassment. When dowry related death cases are studied in relation to occupations status of the victims, the house-wives constitute alarmingly large group i.e. 88.93% cases, followed by private sector employee (8.86%) and only 0.74% cases of Government employee. These findings are more or less similar to Agnihotri study⁶ who observed 95% of cases were house-wives. This is because of their economic and social dependence on husband and in-laws by one or other means.

Conclusions

In Bangalore city, incidence of dowry deaths and harassments are still high. The alleged dowry deaths constitute 04.06% of total male and female autopsies, 11.74% of total female autopsies and 15.05 % of married women autopsies. The incidence remained almost same in year 2004 and 2005. Burning is the commonest mode of dowry deaths, followed by hanging and poisoning. Most of the bride burning cases go unreported or falsely reported as accidental burns i.e., stove burst, catch of fire while cooking etc. Most of the victims died on the spot but those who survived hesitate to make a statement before magistrate either due to fear psychosis or traditional respect for family members and husband. Most of the victims were uneducated or educated less than matriculation or just matriculate and were house wives. Hence, just not the legislation alone, but the government and women organizations can bring down these incidences by increasing educational and socioeconomic status of women and making them aware of their rights and laws related to dowry.

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Patterns of suicidal deaths in Gulbarga region of Karnataka

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Abstract

Suicide is one of the common causes of unnatural death. As suicide continues to be a major problem, a retrospective and prospective study of sociodemographic profile, reasons for suicide, method of suicide and various trends of suicidal distribution in Gulbarga region was conducted over a period of five years from 1st January 2000 to 31st December 2004 using the data from hospital admission papers, police records, postmortem reports, suicide notes if any and history from the relatives & friends accompanying the deceased.

Out of 2528 autopsies conducted in District Hospital of Gulbarga, over a period of 5 years, 464 were suicidal deaths. Majority of the victims were in the age group of 20 to 30 years, the mean age being 30.58 years. Nearly two-third of the victim were from rural areas. Distribution of suicidal cases showed slight male preponderance, majority of the victims being illiterate and unemployed.

Poisoning was the most common modality of suicide followed by hanging and the least being the firearm injury. Chronic illness was the most common reason for suicide. Psychiatric illnesses, financial crisis, harassment by in-laws were the other main reasons for suicide in majority of the cases. Maximum number of suicides occurred at victims' residence.

Keywords

Death, Suicide, Chronic illness, Poisoning,

Introduction

Deaths are always painful for families and friends, but some are more tragic than others. Suicide, with its inevitable legacies of self-recriminations, hurt, bewilderment, guilt and inexpressible rage, plays particular havoc with the survivors. Saddest of all suicides are those of children and adolescents.

Suicide is legally defined as "the intentional act of self-destruction committed by someone knowing what he is doing and knowing the probable consequences of his action".¹

Notwithstanding the trauma the family members face, suicide is posing a major public health problem and a drain on our economy with loss of useful reproductive human resources. About 7,50,000 people commit suicide every year around the world. Suicide is among the ten leading causes of death for all ages in most of countries. In some countries it is among the top three cause of death for people between 15 and 34 years. Rates per year as high as 1 suicide per 1000 population (e.g. Falkland Islands) and 1 suicide per 1500 population (e.g. Hungary) are reported².

According to the National Crime Records Bureau (NCRB), suicide is among the top ten causes of death in India. Suicide is also among the top three causes of death in India for the population between 16 and 35 years². The number of suicides in the country have risen from 40,000 in 1968 to 1.1 lakhs in 1999, which means an increase of 175 percent in three decades. The national incidence rate stands at 11 per lakh per year according to a study conducted by NIMHANS, Bangalore³.

Media reports are replete with attempted suicides and suicides. The emergency wards of every public and private health care institution especially the burns ward are sure

reckoner of these tragic occurrences. The problem of suicide has thus become a salient yet unrecognized pandemic. On the other hand its counterpart 'para-suicide' is paralyzing the human life either temporarily or permanently.

Suicide appears to be the most personal action of individual, yet social relationships play an important part in its causation and it has a profound social impact. While it seems to aim solely at destroying the self, it is also an act of aggression against others. Today it has become a subject of scientific study. Various study of effects of formal religion and informal personal beliefs and suicide rate have been carried out.

Considering these facts, an attempt has been made in the present study to make an analysis of suicide in terms of various epidemiological features.

The study also attempts to know the various trends in the suicidal cases and factors leading to suicide. This may help the different professionals actively involved with the problem of suicide though not for its complete prevention but at least for reduction in the rate of suicides to a minimum.

Material and methods

The present three years retrospective and two years prospective study comprises the profile of all 464 suicidal deaths that were subjected to autopsy at Government General Hospital, Gulbarga during the study period i.e., from 1st January 2000 to 31st December 2004. During the study period, of the total of 2528 autopsies conducted, 464 deaths were suicidal in nature.

Data was obtained from hospital case records, police records suicide notes left over by victims, postmortem reports of all suicidal cases and also by direct interrogation from the relatives, friends and other accompanying the deceased.

Only cases with clear history of suicide were included. All doubtful cases, where the circumstances of death were not conclusive or where the findings of the case were not consistent with history of suicide were excluded from the study.

A proforma was evolved to get uniform information from all the above mentioned sources.

Observations and results

The observations are tabulated in tables 1 to 8.

Observations

Suicide is the second most common manner of death (18.35%), the first being accidents i.e., 64.12% of all autopsies conducted.

Table 1: Age and sex wise distribution of suicidal deaths

Age	Males		Females		Total	
	No	%	No	%	No	%
<20 yrs	20	8.47	58	25.44	78	16.81
20-30yrs	76	32.20	106	46.49	182	39.22
30-40yrs	70	29.66	33	14.47	103	22.20
40-50yrs	38	16.10	13	5.70	51	10.99
50-60yrs	14	5.93	8	3.51	22	4.74
>60yrs	18	7.64	10	4.39	28	6.03
Total	236	100.00	228	100.00	464	100.00

- Maximum number of cases were in the age group of 20 to 30 years i.e., 182 cases (39.22%) the mean age being 30.58 years.
- Suicide cases showed slight male preponderance with male to female ratio of 1.03:1.00
- Majority of suicidal cases were seen in married people i.e., 347 (74.75%).
- Rural victims outnumbered the urban victims constituting 306 cases (65.95%).
- Majority of the victims were illiterate i.e., 290 (62.50%).
- Most of the suicide victims i.e., 171 (36.85%) were unemployed.
- Residence was the location of choice for majority of suicidal victims i.e., in 387 cases (83.41%).
- Chronic illness was the most common reason for suicide i.e., 120 cases (25.86%).
- Poisoning was the most preferred method in both sexes i.e., 200 cases (43.10%).

- Poisoning was the method of choice in rural victims i.e., 156 cases (50.98%). Hanging was the preferred choice in urban victims i.e., 57 cases (36.08%).

Discussion

In the modern civilized society, suicide in general terms has always been designated as a cowardly and shameful act, even though it is viewed with sympathy in minor proportion of circumstances. In spite of its wider perspectives, the etiology

Table 2: Distribution of suicidal deaths according to Marital Status

Marital Status	Males		Females		Total	
	No	%	No	%	No	%
Unmarried	45	19.07	68	29.82	113	24.35
Married	190	80.51	157	68.86	347	74.79
Divorcee/	1	0.42	3	1.32	4	0.86
Widower						
Total	236	100.00	228	100.00	464	100.00

Table 3: Distribution of suicidal deaths according to Education

Education	No	%
Illiterate	290	62.50
Primary	86	18.54
Higher Primary	55	11.85
Graduate	33	7.11
Total	464	100.00

Table 6: Reasons for Suicidal Deaths

Reason	Males		Females		Total	
	No	%	No	%	No	%
Financial Crisis	57	24.15	8	3.51	65	14.01
Chronic Illness	63	26.69	57	25.00	120	25.86
Psychiatric Illness	44	18.64	44	19.30	88	18.97
Harassment by in-laws	3	1.27	58	25.44	61	13.15
Domestic Problems	22	9.32	15	6.58	37	7.97
Extramarital Affair	1	0.42	9	3.95	10	2.16
Love Failure	3	1.27	4	1.75	7	1.51
Sex Assault	0	0.00	8	3.51	8	1.72
HIV Positive	11	4.66	3	1.32	14	3.02
Academic Failure	10	4.25	7	3.07	17	3.66
Death of Family Member	4	1.69	1	0.44	5	1.08
Drug/Alcohol Abuse	2	0.85	3	1.32	5	1.08
Infertility	1	0.42	4	1.75	5	1.08
Others	7	2.98	5	2.19	12	2.59
Not Known	8	3.39	2	0.87	10	2.16
Total	236	100.00	228	100.00	464	100.00

Table 7: Sex wise Modalities of Suicidal Deaths

Modality	Males		Females		Total		Mean Age
	No	%	No	%	No	%	
Burns	31	13.14	69	30.26	100	21.55	28.11
Drowning	17	7.20	19	8.33	36	7.76	34.97
Hanging	83	35.17	35	15.35	118	25.43	30.09
Poisoning	100	42.37	100	43.86	200	43.10	30.99
Rail Run	3	1.27	4	1.75	7	1.51	38.14
Jump from Height	1	0.42	1	0.44	2	0.43	25.00
Fire Arm	1	0.43	0	0.01	1	0.22	55.00
Total	236	100.00	228	100.00	464	100.00	30.58

Table 4: Distribution of Suicidal Deaths according to Occupation

Occupation	Total	
	No	%
Professor	1	0.22
Judicial Officer	1	0.22
Business	37	7.97
Clerk	9	1.94
Attender	6	1.29
Driver	17	3.66
Agriculturist	89	19.18
Coolie	61	13.15
Student	72	15.52
Unemployed	171	36.85
Total	464	100.00

Table 5: Distribution of Suicidal Deaths according to Location

Place	No	%
Residence	387	83.41
Field	25	5.39
Tank	8	1.72
Well	25	5.39
Railway Track	7	1.51
Outdoor	12	2.59
Total	464	100.00

Table 8: Relationship between modalities and Domicile of Suicide Victims

Modality	Urban		Rural		Total	
	No	%	No	%	No	%
Burns	31	19.62	69	22.55	100	21.55
Drowning	22	13.92	14	4.58	36	7.76
Hanging	57	36.08	61	19.93	118	25.43
Poisoning	44	27.85	156	50.98	200	43.10
Rail Run	3	1.90	4	1.31	7	1.51
Jump from Height	0	0.00	2	0.65	2	0.43
Fire Arm	1	0.63	0	0.00	1	0.22
Total	158	100.00	306	100.00	464	100.00

of suicide is ill understood. There is no unanimity among different workers from different parts of the world as has been presented in the review of literature.

A proper understanding of these etiological aspects with respect to that region is a prerequisite for suicide investigation.

The present study consisted of 464 people who committed suicide and were subjected to autopsy at Government General Hospital, Gulbarga. The results of the present study were compared with the studies by different workers from other parts of the country and abroad as well.

Age

The study comprises 464 victims of suicide having a mean age of 30.58 years with a range from 12 to 75 years. The age distribution shows that suicidal death peaks in the age group of 20 to 30 years with 182 cases (39.22%) followed by 30 to 40 years with 103 cases (22.20%).

It could be deduced from the present study that the young people are more prone to get shattered by the turbulence of life more easily. This is consistent with previous works of Ponnudurai R⁴, Heittiarachchi⁵ & Lecomte⁶.

However, Linda EW⁷ reports that more often young and elderly people commit suicide. Dickstra and Gulbinat⁸ reports that adolescents and elderly individuals are at a high risk of committing suicide.

Sex

The total study population consisted of 464 cases of which 236 were males (50.86%) and 228 were females (49.14%), thus showing very slight male preponderance with male to female ratio of 1.03:1.0.

The gender-wise distribution of cases in the present study coincides with the study conducted by Hittiarachchi⁵, Lee Peng K⁹, Le Comte⁶, Sidsel Rodge¹⁰, Chavan KD¹¹ and Chandrashekhar TN¹². But the findings of the present study are in contrast with the studies of Shukla GD¹³, Ponnudurai R⁴ and Singh B¹⁴ in which female predominated over the males.

Marital status

Married people 347 (74.78%) had outnumbered the unmarried ones. This is not consistent with most of the western studies, where highest incidence of suicide was observed among unmarried or lonely people (Linda EW⁷, Bennett and Collins¹⁵, Chang¹⁶). But the findings of the present study are consistent with the Indian literature (Chavan KD¹¹, Shukla GD¹³, Ponnudurai R⁴ and Chandrashekhar¹² and Sahoo PC¹⁷).

More number of suicides in the married people can be explained by the fact that married people are more likely to come under the responsibilities and stress of life besides dowry related problems.

Domicile

In the present study, rural group constituted the maximum

number of suicide victims i.e., 306 (65.95%) and the rest were from the urban areas i.e., 158 (34.05%). The findings of the present study coincides with the study of Sahoo PC¹⁷.

Education

Nearly two thirds i.e., 290 (62.5%) victims were illiterates followed by 86 (18.53%) victims having primary education, 55 (11.85%) victims having higher primary education and the graduates constituted the least with only 33 (7.11%) cases. Males were significantly less educated compared to females ($\chi^2=17.14$; $df=3$; $p<0.001$). The proportion of graduate females was very much less compared with their counterparts.

The observations made in our study fall in line with the study conducted by Shukla GD¹³, whereas they are in contrast with the study conducted by Chandrashekhar¹² in the city of Bangalore, where 68% of the suicide victims were literate and 32% were illiterates.

Occupation

Unemployed group topped the list of suicidal cases i.e., 171 (36.85%) followed by the agriculturists 89 (19.18%) and students 72 (15.52%). This could be explained on the grounds that unemployed people because of the inability to earn their livelihood take shelter under suicide more often than the other sectors of the society. Our findings are consistent with those of McGovern¹⁸ and inconsistent with those of Bhatia¹⁹ in which manual labours topped the list of suicide victims.

But Tan²⁰ has shown that skilled and administrative professionals are at a higher risk of committing suicide.

Location

In the present study, maximum number of suicidal deaths occurred at victim's residence i.e., 387 (83.41%). This observation is consistent with that of Jefflee²¹, Alice Seabourne²², Ramsay²³, and Sidsel Rodge¹⁰.

From this observation it could be deduced that suicide victims usually choose the surroundings familiar to them and which is easily accessible. The more familiar the setting, the greater possibility of the victim to acquire the necessary tools within a short span of time.

Reasons for suicide

Chronic illness tops the list of reasons for suicide with 120 cases (25.86%) followed by psychiatric illness with 88 cases (18.97%). Death of family member, drug/ alcohol abuse and infertility were the causes for minimum number of suicidal deaths accounting for 5 cases each (1.08%).

The findings of our study are consistent with those of Chavan KD¹¹ & Lee Peng⁹ where chronic illness was the chief cause for suicide in 23.01% and 57% respectively.

Methods of suicide

Various methods of suicide in a region depend upon variety of factors ranging from availability and access of the method to the socioeconomic status of the individual and also on the prevailing cultural and religious influences.

It is observed from the present study that poisoning was the most common method of suicide with 200 cases i.e., 30.99%. Next common methods were hanging (25.43%) and burns (21.35%). This is consistent with the studies conducted by Chavan,¹¹ Dhatarwal SK²⁴, Le Comte⁶, Sidsel Rodge¹⁰, Hettiarachchi⁵ and Shukla GD¹³ having 69.8%, 49.8%, 28%, 81.6% and 22.6% of cases of poisoning respectively.

But findings of Ponnudurai R⁴ with 37.9% cases, Fimate²⁵ with 53.7% cases, Sahoo PC¹⁷ with 46.98% cases, Alice Seabourne²² with more than 50% cases, Louise Ramsay²³ with 86% cases, McGovern et al¹⁸ with 49% cases indicate hanging as the most preferred method of suicide.

Tan²⁰ and Lee Peng⁹ in their studies have shown that jumping from height was the most common mode of suicide in Singapore with 58.4% and 62.3% of cases respectively. Burning was the preferred method of suicide in 39.8% cases in study conducted by Singh B¹⁴ in Delhi region and gun shot injuries was the most common method with 77.4% cases in the study of Jeff Lee²¹ in California.

Poisoning, hanging, burning were the three most common modalities of suicide accounting for 90% of the cases of the present study. Drowning (7.76%), getting runover by trains (1.51%) were rare methods. Jumping from height (0.43%) and firearms (0.22%) were the least common methods employed.

As would be apparent from the table-7, there was a significant difference between the two sexes with regards to the method of suicide ($\chi^2=33.94$, $df=4$, $p<0.001$). More than two thirds of burns cases (69%) were females. This is consistent with the observations of Chavan KD¹¹, Singh B¹⁴, Shukla GD¹³. Hanging was most commonly employed by males with 83 cases (70.33%) and merely 35 females (29.67%) used this method. This observation falls in line with those of Chavan KD¹¹, Shukla GD¹³ and Fimate²⁵.

Poisoning and jumping from height were equally distributed among both sex groups. Violent methods like use of firearm were used exclusively by a male victim in the present study.

Insecticides were the most common type of poisons utilized by the victims. This could be attributed due to the easy availability and lack of stringent laws regarding their use. These accounted for 148 out of 200 cases of poisoning. Sleeping pill overdose was the next common with 23 cases and the exact nature of poison was not known in 29 cases.

Method and domicile

It is observed from the present study that the relationship between the modalities and domicile of suicide victims was significant ($\chi^2=35.91$, $df=4$, $p<0.001$).

In rural areas maximum number of victims i.e., 56 (50.98%) preferred poisoning as a suicidal modality probably because of the easy accessibility to the insecticidal poisons related to the agricultural works. The least constituted jump from height i.e., 2 (0.65%).

In urban areas, the preferred modality was hanging i.e., 57 (36.08%) and least constituted by firearms i.e., 1 (0.63%) cases.

Material is not found in the literature to compare with the present study.

Conclusion

Few tragedies are as devastating as suicide especially of a young person. As suicide continues to be a major problem we need to be aware of the common scenario so that a proper

and thorough investigation can be performed. From the present study, it can be concluded that most of the suicides involve people in third and fourth decade of life, majority from rural areas, males slightly more than females, more illiterates, unemployed, and at their residence,

Hanging, burns, drowning, run over by train, fall from height, firearms were the methods of suicide, poisoning being the most common method chosen by victims.

Financial crisis, psychiatric illness, harassment by in-laws, academic failure, and domestic problems were the reasons for suicide, chronic illness being the reason in maximum number of victims.

Suicide is a manner of death that is often difficult to accept by the family and can pose a challenge to death investigators. This study helps to identify people at risk and the common scenario involved. Only through better understanding of the entity we can properly assign the cause and manner of death and work towards its prevention in future cases.

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Forensic odontology: A myriad of possibilities

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Abstract

Violence and serious acts of crime pose a large problem in today's society, with the increasing rate and sophistication of crime, it's becoming more difficult for the collection of viable and suitable evidence, equally there has been a tremendous research which has led to advancement in the forensic odontology on a global scale. Forensic sciences is a boon to tackle the present rate of crime and dentists play a major role, as the teeth are the only pivotal structures available in a totally decomposed, burned and mutilated body, as they are not affected by extreme changes in temperature and the environmental factors. The responsibility of a dentist in gathering evidence is crucial, which has to be presented in the interest of justice(1).

Introduction

Forensic dentistry may be defined as the application of dentistry in legal proceedings deriving from any evidence that pertains to teeth and associated structures. Teeth play a significant role in identification as the dental characters are unique to each individual; moreover the teeth are not destroyed in extreme conditions as they can withstand temperatures up to 1100° celcius(2).

Thus, a dentist plays a key role and a lot of research work is being done to identify human remains, to analyse bite marks, estimate the age of the victim and trace dental malpractice.

History

Teeth as means of identification is not a new phenomenon, it dates back to 49 B.C. History reveals dental evidence as an important source of identification. One of the earliest known examples of forensic dentistry involved Agrippina, the mother of Roman emperor Nero. In 49 B.C., Agrippina ordered the death of her rival Lollia Paulina, who demanded to see Lollia Paulina's head as proof of her death, but she wasn't sure that her rival was dead until she noticed Lollia Paulina's distinctive discoloured front teeth.

Another famous foray into forensic dentistry was that of Paul Revere, who in addition to being a blacksmith was also a dentist. He helped to identify the people dead in the Revolutionary War who were buried on the battlefield by their teeth and dental work. Revere was able to identify Dr. Joseph Warren, because he had made him a partial denture out of silver wire and pieces of hippo tusk(3).

The German dictator Adolf Hitler and, the Indian Prime minister Mr. Rajiv Gandhi were identified using dental records. The memories of the 9/11 world trade centre attack are still fresh in our minds, very surprisingly 20% of the victims were

identified using dental records. Even in a natural disaster like tsunami 90% of the victims were identified using dental records.

Latest techniques for dental evidence collection

The latest techniques and methods of evidence collection from forensic remains is a boon to crime scene investigation. The latest techniques for identification include:

Imaging techniques

1. Nomad hand held x ray unit
2. 3-d computer aided stereophotogrammetry.
3. Magnetic resonance imaging (MRI)

Biochemical techniques

1. Capillary electrophoresis.
2. DNA Typing.

Recovering dna for anthropological studies

1. Orthograde entrance technique.

Nomad hand held x ray unit

This x ray unit is very helpful in mass disasters, crime scene investigations where the bodies are severely mutilated, with soft tissue destruction and where dental hard tissues are the only source of evidence, it is impractical to shift the bodies to x - ray units for taking radiographic images in crime scenes, mass disasters, thus a portable, lighter in weight and battery operated investigation x ray unit is developed to take the images on a big scale.

Description

The NOMAD system is a handheld, battery-operated, portable device. It is powered by a 14.4 volt rechargeable battery. The unit is designed with reduced weight and size for easy manipulation by the operator. NOMAD has the other beam quality and safety features normally specified for dental intra-oral systems. The beam limiting device (exit cone) is lined with lead this would not normally be required in a dental unit, as the exit cone is defined by lead apertures closer to the tube. The minimum inherent filtration in the x-ray beam is at least

Summary of specifications of NOMAD:

PARAMETER	VALUE
Anode voltage	60kv
Anode current	2.3 mA
Exposure time reange	0.01-0.99s
Focal spot soze	0.4mm
Minimum inherent filtration	1.5mm Al equivalent
Source to skin distance	20 cm
X-ray field	60 mm round
Maximum duty cycle	1s:60s
Total weight	<4 kg

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1.5mm Al equivalent. The source-to-skin distance is a minimum of 20 cm. The radiographic technique factors of peak potential and anode current are both fixed at 60kV and 2.3mA respectively. The only operator-adjustable parameter is the irradiation time, which varies from 0.01 to 0.99 seconds(4,5).

Advantages of nomad x-ray unit over conventional intraoral radiography:

1. The high-voltage power supply is a high-frequency DC unit, which reduces the dose to the patient.
2. The x-ray tube is surrounded by compounds of heavy metals to reduce the leakage radiation from the tube. (These compounds are not lead, but a proprietary mixture designed to provide equivalent or better shielding).
3. Less backscatter radiation - Backscattered radiation is also absorbed in a lead-filled acrylic shield attached at the end of the exit cone. This shield has a lead-equivalent of 0.5mm thickness, and protects the operators' hands, face, and gonads from backscattered radiation.
4. High-frequency, constant potential has been shown to reduce patient dose by up to 1/3 per image.
5. System is optimized for digital sensors at 60kV. Digital sensors reduce the dose per image by 1/4th to 1/10th compared with conventional film.
6. Beam is limited to 6cm diameter, rather than the allowed 7cm. This smaller irradiation area reduces the patient dose by 25% without significantly compromising the beam aiming capability.

3d-computer aided stereophotogrammetry

Due to availability of many modern imaging systems it seemed of importance that some of these could be adapted for the use of dental imaging in the area of Forensic Dental identification.

The basic principle of stereophotogrammetry is to imitate the subtle differences viewed by both of our eyes. Each image received by each eye is subtly different due to the fact that our eyes are roughly 20mm apart from one inner canthus to other inner canthus. These differences are called 'binocular disparities' when integrated by the visual cortex of our brain result in a combination of images to create depth and field. The process of fusion is known as "stereopsis". The process of twin image pairs have been adopted in the field of photography to allow the construction of 3d stereoscopic images by taking two pictures of the same object at a subtly different angle. A computer based programme was developed for constructing 3d images of real time objects. 3d stereophotogrammetry employs the use of the common Microsoft windows operating system to allow the user an ease of use graphical user interface to capture the stereo image pair and also using a mathematical equation to construct the wire frame 3d model as a data file(1).

Magnetic resonance imaging

With the increase of more serious forms of criminal behaviour, crimes such as assaults, rapes, murders, child and elderly abuse plus crimes of passion have shown the presence of bite marks on the victim more commonly which play a crucial role in crime scene investigation.

Bite marks may be defined as physical alteration or pattern left in, or on an object or tissue, caused by dental structures of an animal or human being. It can be inflicted in various ways and on different parts of the body. The bite marks can be seen as impressions left on food, skin or other items left at the scene.

Mri in bite mark analysis

Magnetic Resonance Imaging or Nuclear Magnetic Resonance provides clear pictures of body's interior—including tissues, organs and blood vessels—without the use of hazardous

radiations of X-Rays. MRI is very useful in crime scene investigation especially in the analysis of bite marks. It is done by comparing the bite marks of the suspect on an apple with that of the victim's body part. The suspect is made to bite on an apple and impressions are taken from the apple and the victim's body bite mark, this is followed by pouring of casts. The collected subject material, apple casts and dental stone casts, were required to be sectioned into 2cm cubic samples. This limitation of imaging size was due to the limitation of the local MRI coil size. The stone casts for taking MRI images were soaked in water for 5 minutes, as hydrogen protons are responsible for resonance. Images were captured and compared. The limitations seen in the current set up of NMR Imaging is that of size and cost. Apparently, to allow accurate surface detail of the bitten objects and teeth, only small 2 cm sections can fit in the active imaging area of the magnetic field. Magnetic Resonance Image showed the most promise for development into a reproducible and acceptable form of court presentation of bite marks. Methods of collecting impressions of the suspect's teeth are excluded and impressions of the bite site are also possibly eliminated. This, therefore, makes the process completely non-invasive and also reduces the chance of error integration from steps introduced in the Lab. The possibility of the use of a portable intra-oral MRI coil has shown promise. This would completely eliminate the need for impressions and also would greatly increase image resolution further as the 'scanning' would be of living tissue and not an indirect cast or model(1).

Advances in bite mark analysis with mri

The construction of MRI imaging coils that can be placed directly in the suspect's mouth. The overall method will eliminate the requirement for primary impression and also lab timing in pouring up the dental casts.

Advantages

1. Test is painless.
2. No radiation or harmful side effects.
3. Noninvasive method of viewing the insides of the body.
4. Can provide images from multiple viewpoints and is effective at differentiating between various soft tissues.
5. Provides images of organs that otherwise would be obscured by bones or foreign bodies.

Disadvantages

1. May be uncomfortable for people who don't like confined spaces or have claustrophobia.
2. Expensive tests — more expensive than X-rays or CT scans.
3. Test can be time-consuming.
4. Test can be affected by body movement.
5. Can't be used on people with some implanted metal objects, such as pacemakers.

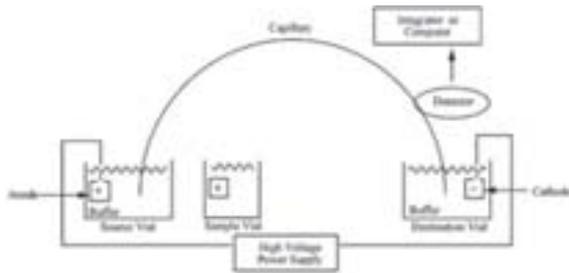
Capillary electrophoresis

A powerful and new analytical tool, which is used for organic and elemental identification. It has the exceptional power of separation and resolution, rapid analysis time, simplicity, versatility, low mass limits of detection, economy of reagents, minimal sample requirements and the possibility of direct sample injection without complex sample pre-treatments make capillary electrophoresis an attractive methodology to forensic scientists when the sample matrix may be extremely complexed as in victim's amalgam or composite restorations, denture base material, gunshot wound in the oral cavity and a number of other endogenous compounds that have to be resolved from the solute of

interest(6).

Capillary electrophoresis, also known as capillary zone electrophoresis, can be used to separate ionic species by their charge and frictional forces and mass.

The instrumentation needed to perform capillary electrophoresis is relatively simple. A basic schematic of a capillary electrophoresis system is shown in the figure. The system's main components are a sample vial, source and destination vials, a capillary, electrodes, a high-voltage power supply, a detector, and a data output and handling device. The source vial, destination vial and capillary are filled with an electrolyte such as an aqueous buffer solution. To introduce the sample, the capillary inlet is placed into a vial containing the sample and then returned to the source vial (sample is introduced into the capillary via capillary action, pressure, or siphoning). The migration of the analytes is then initiated by an electric field that is applied between the source and destination vials and is supplied to the electrodes by the high-voltage power supply. It is important to note that all ions, positive or negative, are pulled through the capillary in the same direction by electroosmotic flow, as will be explained. The analytes separate as they migrate due to their electrophoretic mobility, as will be explained, and are detected near the outlet end of the capillary. The output of the detector is sent to a data output and handling device such as an integrator or computer. The data is then displayed as an electropherogram, which reports detector response as a function of time. Separated chemical compounds appear as peaks with different retention times in an electropherogram(7).



Thus, Capillary electrophoresis represents today a sound and widely accepted technique in forensic analysis and has been used to analyse different types of forensic samples.

Dna typing: A new approach to identification

Empirically, small amounts of DNA are relatively well-preserved in fossils, buried mummies

and various remnants of human dental and skeletal tissues. During the last decade a new methodology was invented termed "polymerase chain reaction," or PCR, which literally enables that amplification of very tiny amounts of DNA to concentrations suitable for diagnostic analysis. The PCR technology is remarkably useful in amplifying

these very small amounts of either the so-called genomic DNA found in the nucleus or the mitochondrial DNA found in the mitochondria organelles that are inherited exclusively from our mothers and that populate essentially all somatic cells. These biological facts enable unequivocal diagnosis from minute quantities of isolated genomic or mitochondrial DNA, or mt DNA. About 25 percent of the entire human genomic DNA consists of highly repetitive nucleic acid sequences. The discovery of these large extensions of repeated nucleotide sequences in animal and human DNA came as a great surprise. In some mammals, a single type of satellite DNA sequence constitutes more than 10 percent of the DNA and may even occupy a whole chromosome arm (millions of copies of the repeat length per cell).

Satellite DNA sequences seem to have changed rapidly

and to have shifted their positions on chromosomes in the course of evolution. The human genome contains at least several predominant satellite DNA sequences, a different mixture of which is found at each centromere. The number of copies of a satellite DNA vary over a wide range so that remarkable comparisons can be identified that discriminate between two people. This biological discovery has led to a strategy and technology sufficient to discriminate between two brothers or sisters with a confidence level of more than 90 percent. Further, this feature of human genomic DNA enables identification and discrimination between siblings and between siblings and their parents. Considering the "biochemical math," we appreciate that there are 450 grams in one pound; one g equals 1,000 micrograms; one milligram equals 1,000 nanograms; one nanogram equals 1,000 picograms; and 1 pg (a millionth of a g) equals 1,000 femtograms (a billionth of a g). A sample as small as 20 to 70 pgs of target genomic DNA is sufficient to perform highly reliable forensic DNA typing.

The amel gene

The sex of skeletal bones or teeth can be rapidly determined with enormous accuracy in a segment of the human X or Y chromosome encoded AMEL gene. There are subtle yet significant differences in the amelogenin proteins synthesized from either the X or Y chromosome. The fact that the X- and Y-specific AMEL genes are 106 and 112 base pairs, or bp, in length, respectively, provides a relatively direct procedure to discriminate between male and female AMEL. On a bar-code type of display, a male DNA sample appears as two discrete bands of 106 and 112 bp. A female DNA sample appears as a single band of 106 bp for the gene AMEL. The male has two different AMEL genes (one located on the X and the other on the Y chromosome), while the female has two identical AMEL genes located on the X chromosomes. This distinction between human male and female AMEL genes is remarkably specific, sensitive and cost-effective for modern forensics.

Mitochondrial DNA

The other cellular source of DNA used for identification purposes

is mt DNA. Mt DNA is found in about 750 mitochondrial organelles located in the cytoplasm of each cell in the human body. The mitochondrial DNA represents 0.5 percent of the total DNA and is readily separable from the genomic DNA. Mt DNA is 16,569 nucleotide bp in length and is present in high-copy number in all cells and is more likely to survive for prolonged periods, compared to chromosomal DNA. Mt DNA is very useful in forensic identification, as it is inherited only from the maternal line and is the best way to test relatedness if there are several generations between ancestor and living descendant. In contrast to human genomic DNA, which codes for 100,000 genes, mitochondrial DNA encodes for only 13 different genes. Mt DNA analyses have extended the range of analysis from a few thousand years ago to more than 13 million years ago. Mt DNA has been used to identify 7,000-year-old brain tissue, 5,500-year-old bone remnants as well as bones from the grave of the Romanov family killed in 1918. Just 10 years ago, it would not have been possible to make these statements.

Dental identification is absolutely specific to a person. There are, however, situations in which dental patient records are not available, such as in the Romanov case or in the Spitsbergen airline disaster. In these examples, DNA typing is an ideal strategy(8).

Orthograde entrance technique

Orthograde entrance technique is used for anthropological

studies. As the tooth is the most valuable source to extract DNA, since it is a sealed box containing DNA preserving it from environmental conditions. Earlier to recover DNA from ancient teeth, reverse root canal technique was used to collect DNA that is, DNA was recovered by perforating the apex of the tooth but this technique has some disadvantages, as the root of an ancient tooth sample is highly fragile, permeable and weak, the tooth was more viable for fracture, therefore, an alternative "orthograde entrance technique" is used in which the D.N.A is extracted by perforating the tooth from the coronal aspect from the enamel. In this way tooth structure is preserved during the tooth entrance progress. On the other hand, proposing an entrance through the enamel surface, the most durable tissue, instead of the root apex minimizes the risk to damage the tooth during the process of taking sample. In the reverse root canal technique, it is more likely that sterilising agents perpetrate into the pulp canal and cavity through cement layers and dentinal tubules, which may damage DNA. The fact that enamel is less permeable, compact tissue than the layered root cement makes orthograde entrance technique more favourable, rendering more severe operations applicable during decontamination(9).

Conclusion

Advances in technology show a great promise for integration of evidences in forensic odontology. It's important to make use and evaluate these new approaches to aid in the identification of individuals in crime scenes to ensure that the correct person is brought to justice for their actions. It is noted that these new methods have been tried and tested, and they proved to be successful. With the availability of advancement of technology it is possible to have greater number of positive identifications with respect to possible identification of an

individual. But the methods employed for collecting related evidence have not changed nearly for 30 years so this article lays emphasis on the latest techniques and advances in forensic odontology.

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Camurati Engelmann's Disease (CED): A case report

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Abstract

Camurati Engelmann's disease is rare and is characterized by severe limb pain, proximal muscle weakness and hyperostosis of long bones and the skull. We report a case of Camurati Engelmann's disease with decreased muscle mass and weakness. There was increased lumbar lordosis, calcaneovalgus of both feet and enlargement of shafts of femur and tibia. Diagnosis was established on X-rays which showed hyperostosis of both femur and tibia and sclerosis of skull bones. The child was put on corticosteroids and analgesics and there was alleviation of symptoms after two follow-ups.

Keywords

Camurati-Engelmann's disease, lumbar lordosis, hyperostosis, corticosteroids.

Camurati-Engelmann disease (CED) is characterized by hyperostosis of the long bones and the skull, proximal muscle weakness, severe limb pain, a wide based waddling gait, and joint contractures.¹ Condition is seen most commonly in males and usually in childhood. The exact etiology is unknown. Facial features such as frontal bossing, enlargement of the mandible, proptosis and cranial nerve impingement resulting in facial palsy are seen in severely affected individuals later in life. The diagnosis of CED is based on physical examination and radiographic findings. Bone and muscle histology are non-specific. Transforming growth factor beta-1-gene (TGFB1) is the only gene known to be associated with CED.² CED is inherited in an autosomal dominant manner. Each child of an individual with CED has a 50% chance of inheriting the TGFB1 mutations.

Case report

A nine-year old male child presented with pain and progressive weakness in both lower limbs for the past one year.

The child's birth was eventful with history of prolonged labour and birth asphyxia. He did not cry for five hours and was cyanosed at birth. There was history of delayed milestones with social smile at 8 months, head holding at 1 year, sitting with support at 1½ years, sitting without support at 2 years, walking with support at 3½ years and walking without support at 5 years. The child was fully immunized. The child failed to gain weight progressively during these years. The child started with weakness and pain in both lower limbs for last one year which has progressed. Pain was moderate to severe in intensity and increases with activity and stress. There was history of gradual increase in swelling of proximal aspect of both legs.

On examination, the child looked thin, emaciated and weak [Figure 1]. Frontal and parietal bossing was present. Dentition was retarded.

In the lower limbs there was decreased muscle mass and

weakness. The child had difficulty in rising from a sitting position. The child had wide-based waddling gait. There was increased lumbar lordosis [Figure 2] and both feet were in calcaneovalgus [Figure 3]. There was enlargement of shafts of femur and tibia on both sides which was clinically palpable and tender. The motor power was Grade-IV in all four limbs. Tone was normal and reflexes were sluggish. Planters were down going on both sides. Bowel and bladder habits were normal and testes were retracted.

Radiologically, there was **hyperostosis** of both femur and tibia, well marked in femur. There was periosteal and endosteal bony sclerosis of the diaphysis of femur and tibia. There was uneven cortical thickening, increased bone diameter and a narrowed medullary canal [Figures 4 and 5]. The skull was involved with thickening and sclerosis over the base of the skull at the basiocciput, over the frontal region and the petrous part of the temporal bone [Figure 6]. All biochemical and hematological investigations were normal.

The child was put on corticosteroids and analgesics for alleviation of pain. He was followed-up monthly. At first month follow-up, there was decrease in pain and weakness with improved gait and exercise tolerance. At second month follow-up, there was further alleviation of symptoms and the dose of corticosteroids was tapered. The child is still under follow-up.

Discussion

Engelmann's disease was first described by Camurati (1922) of Bologna who described a rare type of 'symmetrical hereditary osteitis' involving the lower limbs in a father and son and several others in a total of four generations. Pain in the legs and **fusiform swelling** of the legs below the knees were noted. Engelmann of Vienna described the second reported occurrence of CED in 1929 as "osteopathic hyperostotica (sclerotisans) multiplex infantilis". The terms 'Engelmann disease' and 'diaphyseal dysplasia' were commonly used until Neuhauser *et al* (1948) coined the term 'progressive diaphyseal dysplasia'. Gullidge and White (1951) suggested the term 'progressive diaphyseal hyperostosis', which was not widely used^{3, 4}. The prevalence is unknown. At least 200 individuals have been reported so far.

Individuals with CED present with limb pain, proximal muscle weakness, poor muscular development, a wide based waddling gait, easy fatigability and headaches. The average age of onset of symptoms in the 199 reported individuals is 14 years. Decreased muscle mass and weakness are most apparent in the proximal lower limbs resulting in difficulty when rising from a sitting position⁵. A wide-based, waddling gait is found in 64% of individuals. Joint contractures occur in 43% of individuals. Marfanoid body habitus is described in some affected individuals. Bone pain is reported in 90% of affected individuals. The pain is described as constant aching and most intense in the lower limbs. Pain often increases with activity, stress and cold weather. The enlarged bone shafts can also be palpable and tender on examination. 52% of affected individuals report bone tenderness with palpation. Susceptibility to fracture may be reduced because of increased bone mineral density, but healing of fractures may be delayed.⁸

Sclerosis of the cranial nerve foramina can lead to direct nerve compression or neurovascular compromise. Cranial nerve

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Fig. 1: Physical appearance of child showing that child is thin, emaciated and weak.



Fig. 2: Photograph showing exaggerated lumbar lordosis.



Fig. 3: Photograph showing that both feet are in calcaneovalgus



deficits occur in 38% of affected individuals. The most common deficits are hearing loss, vision problems and facial paralysis. Approximately, 15% of individuals with CED have conductive and/or sensory neural hearing loss. Involvement of the orbit can lead to proptosis, papilledema, epiphora, glaucoma and subluxation of globe. Rarely, clonus, sensory loss, slurred speech, cerebellar ataxia and bowel and bladder incontinence are reported.⁷

Musculoskeletal involvement can lead to varying degrees of lumbar lordosis, kyphosis, scoliosis, coxa valga, genu valgum, flat feet and frontal bossing. Rare manifestations include anemia, anorexia, hepatosplenomegaly, decreased subcutaneous tissue, atrophic skin, hyperhidrosis of the hands and feet, delayed dentition, extensive dental caries, delayed puberty and hypogonadism^{7, 8}.

Features essential to the diagnosis of CED include – radiographic findings of hyperostosis of one or more of the long bones. Periosteal and endosteal bony sclerosis of the diaphysis of the long bones resulting in uneven cortical thickening, increased bone diameter and in some cases a narrowed medullary canal. Hyperostosis is usually restricted to the diaphysis but may progress to the metaphysis. The epiphyses are rarely, if ever, involved. Hyperostosis is usually symmetric in the appendicular skeleton but may be asymmetric. The bones affected in order of frequency are femur, tibia, humerus and fibula. The skull typically is affected by the thickening and sclerosis over the frontal region, the base of the skull at the basiocciput and the petrous portion of the temporal bone.⁹

Transforming growth factor beta-1-gene (TGFB1) is the

Fig. 4: X-ray of both femur showing uneven cortical thickening, increased bone diameter and a narrowed medullary canal.



Fig. 5: X-ray of both tibia showing enlargement of shaft, cortical thickening and narrowed medullary canal



Fig. 6: X-ray of skull showing thickening and sclerosis over the base of the skull.



only gene known to be associated with CED.

In the differential diagnosis, Caffey's disease (infantile cortical hyperostosis) must be differentiated. Caffey's disease is usually seen before 6 months of age and is invariably accompanied by fever, increased density is often unilateral, the mandible is frequently affected, and the roentgenographic changes disappear with complete recovery. Other diseases which may be differentiated are craniodiaphyseal dysplasia, juvenile Paget disease, diaphyseal dysplasia with anemia, hyperostosis corticalis generalization and SOST-related sclerosing bone dysplasias.⁹

Management of CED begins with the initial evaluation which include neurologic examination, measurement of blood pressure, complete skeletal survey, ESR, CBC count, hearing screening and ophthalmologic evaluation. Corticosteroids may relieve many of the symptoms of CED¹. Several investigators report success with corticosteroid treatment in reducing pain and weakness, improving gait, exercise tolerance, flexion contractures and correcting anemia and hepatosplenomegaly. Individuals with severe symptoms can be treated with a bolus of prednisolone 1.0 - 2.0 mg/kg/day followed by rapid tapering to the lowest alternate day dose tolerated. Less symptomatic individuals can be started on 0.5 - 1.0 mg/kg every other day. High dose steroids may help with acute pain crisis.¹⁰

Losartan can be tried in symptomatic individuals who do not tolerate corticosteroids or who have concomitant hypertension. Losartan has an anti-TGFB1 effect and is being tested in Marfan syndrome. Other analgesics and non-pharmacologic methods are frequently used for alleviation of pain.

Reports of successful treatment of hearing loss in CED are rare. Surgical decompression of the internal auditory canals can improve hearing. However, the skull hyperostosis is progressive and cranial nerve compression often recurs. Bilateral myringotomy can improve conductive hearing loss resulting from sensory otitis in individuals with CED.

After initiating corticosteroids, affected individuals should be followed monthly with efforts to taper the steroids to the lowest tolerated dose. Blood pressure should be monitored at each visit, as hypertension can develop following the initiation of steroid therapy. When a maintenance steroid dose is achieved, yearly exclusion should include a complete neurologic examination, CBC count, blood pressure and hearing screening.¹¹

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Sexual assault and murder of a 11 year old girl: A case report

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Abstract

Rape is one of the crimes out of all offences of violence against a person in which the services of medical science are some times indispensable to the administration of justice Rape is regarded as the most brutal and infamous crime in all civilized countries and penalty is justly severe. In India the punishment is life imprisonment .In the present investigation, a girl aged about 11 years was found dead in a well of an agricultural field on 09.09.09. at 7:00 a.m. Inquest commenced on 09.09.09.at 11:00 a.m. at scene of offence. Autopsy findings revealed that it is clear cut case of sexual offence and murder The body is in decomposed state, skin peeled off here and there, marbling seen on the chest, tongue and eye balls protruded, right eye eaten by aquatic animals (Artifacts), abdomen distended with decomposed gasses. Vagina admits two fingers, hymen torn at 5^o clock and 7^o clock position, the torn margins were extended up to posterior fornix.

Keywords

Sexual assault, child abuse, Judicial punishment

Introduction

Rape is one of the crimes out of all offences of violence against a person in which the services of medical science are some times indispensable to the administration of justice The essential element of the offence may rest entirely on medical evidence. Hence medical evidence and its relation to the administration of law are very important. Rape is regarded as the most brutal and infamous crime in all civilized countries and penalty is justly severe. In India the punishment is life imprisonment. Rape is defined as an unlawful carnal knowledge of a woman by force and against her will or consent or with her consent which has been obtained by putting her to fear, fraud and such other means as impersonation and stupefaction. Sexual assault is an assault of a sexual nature on another person. Although sexual assaults most frequently are by a man on a woman, it may be by a man on a man, woman on a man or woman on a woman.^[1] Largely because of child rape and an epidemic of prison rape approximately ten percent of all rapes are suffered by males.^[2] While sexual assaults are associated with the crime of rape, it may cover assaults which would not be considered rape. What constitutes a sexual assault is determined by the laws of the jurisdiction where the assault takes place, which vary considerably, and are influenced by local social and cultural attitudes. It has been said that sexual assault includes rape, forced vaginal, anal or oral penetration, forced sexual intercourse, inappropriate touching, forced kissing, child molestation, and the torture of the victim in a sexual manner.

Rape definition in IPC

As per section 375 I.P.C rape is defined as an unlawful, sexual intercourse by a man with a woman, his wife less than 15 years, any women less than 16 years – with or without her consent, or when the consent is obtained by an illegal method like –

- a) Putting her or anyone else in whom she is interested in fear of death.
- b) Putting her or anyone else in whom she is interested in fear of hurt.
- c) When she is under influence of drinks or drugs: or of unsound mind.
- d) By impersonation i.e., the man knows that she is not his wife, but she gives consent presuming him to be the man to whom she is lawfully married.
- e) Or by misrepresentation of facts.

Custodial rape

Means rape of a woman by the people in whose custody she is detained eg: Police station, jail, hospital, asylum, or remand home. In these cases, if sexual intercourse is proved and she states that she did not consent for the act, the law presumes that the act was done without her consent (Sec 114 –A I.E.A).

Gang rape

Rape done by more than one person.

Legal sections dealing with Sexual assault

1. Sec. 376 I.P.C. deals with punishment for rape. Punishment, ranges between 7 years to life imprisonment and fine.
2. Even an accomplice of rape can be awarded life imprisonment under sec. 376 (1) I.P.C.
3. In custodial rape, gang rape, child rape (less than 12 years), rape on pregnant woman - imprisonment between 10 years to life and fine (sec. 376 (2) I.P.C).
4. In custodial rape if it is sexual inter course – not amounting to rape – up to 5 years + fine If rape on his own wife, whose age is not less than 12years – up to 2 years imprisonment (Sec. 376 B,C,D of I.P.C).
5. If rape on wife during separation – up to 2 years imprisonment (Sec. 376 A I.P.C).
6. Sec. 327 (2) Cr.P.C – Enquiry or trial under section 376 I.P.C will be done in camera .
7. Sec.328 – A I.P.C – Revealing the identity of a victim of rape is an offence (up to 2 years imprisonment and fine).
8. Sec.354 I.P.C. - Deals with indecent assault to outrage the modesty of a girl e.g : Stripping naked, kissing, fondling, touching private parts, fingering etc - Imprisonment up to 2 years or fine or both.
9. Sec. 497 I.P.C- Deals with adultery i.e., sexual intercourse with a married women even with her consent – imprisonment up to 5 years.
11. Sec. 499I.P.C - Co-habitation caused by a man deceitfully inducing the belief of future lawful marriage imprisonment up to 10 years.

Case History

A girl aged about 11 years was found dead in a well of an agricultural field on 09.09.09. at 7:00 a.m. Inquest report held over to dead body of the deceased concerned in Cr.No:83/09.U/S302,376 I.P.C of Chennur P.S. Inquest commenced on

09.09.09.at 11:00 a.m. at scene of offence.

Autopsy findings

External appearance

Body is dressed in school uniform of white blouse and blue skirt. The body is in decomposed state, skin peeled off here and there, marbling seen on the chest, tongue and eye balls protruded, right eye eaten by aquatic animals (Artifacts), abdomen distended with decomposed gasses.

Internal findings

There was an abraded contusion seen in the inner aspect of the gums of upper and lower lips measuring 1cmsX 2.5 cms (teeth marks) and fracture of nasal bridge seen. Vagina admits two fingers ,Hymen torn at 5^o clock and 7^o clock position, the torn margins were extended up to posterior fornix.

Cause of death

Death is due to respiratory failure consequent to homicidal smothering and there is evidence of sexual intercourse

Discussion

Sexual assault is an emotionally, physically and psychologically destructive crime Samples are usually collected from three main areas such as Clothing, evidence found on the body and Evidence found in the genital and anal region. Some of the victim's clothes, saliva, blood, pubic hair and head

hair samples may also be taken into evidence. Swabs from the vagina or anal area are also taken depending on the nature of the assault.

In the present case report both external as well as internal findings revealed a clear cut incidence of rape and murder. Incest between a child or adolescent and a related adult has been identified as the most widespread form of child sexual abuse with a huge capacity for damage to a child.^[3]

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Morphometry of adult human femur

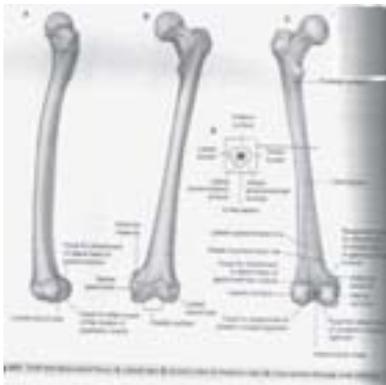
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Abstract

Femur is the long bone studied and analysed for its importance in medico legal cases and forensic identification of an individual. The knowledge of normal anatomical features and morphometry of femur are pre-requisites for complete understanding of mechanics of hip and knee joint and diseases of these joints as well. Increased femoral anteversion can cause failure of treatment of congenital dislocation of hip (Morscher 1967) and if not appropriately cared for in the prosthesis then even in treatment of total hip replacement. This fact makes the morphometry of femur important not just for orthopaedicians but also radiologists who use neck shaft angle for diagnosis and managing hip diseases. The neck shaft angle is increased in congenital subluxation and dislocation of hip, idiopathic scoliosis, perthe's disease and slipped capital femoral epiphysis. For The now gold standard treatment of osteoarthritis and fracture neck of femur in elderly, total hip replacement, the normal morphometry of the upper end of femur like head diameter, neck shaft angle and angle of anteversion must be precisely known. Hence the extensive morphometric study on femur was undertaken by us the observations of which are given under.

Introduction



The lower limb is primarily adapted for weight bearing and locomotion. Femur is the longest (45 cm) and the strongest bone in the human body. Its length is associated with a striding gait and its strength with weight bearing and muscular forces.

The upper end of femur consists of head, neck, greater and lesser trochanters and intertrochanteric line. The head is articular and forms two thirds of a sphere. The neck about 5 cm long is directed upwards, medially and slightly forwards. The neck meets the shaft at an angle of 125° in adult but the angle is wider, about 160° in a child. The elongated neck and neck shaft angle allows the lower limb to swing clearly away from pelvis and increase the range of movement at the hip joint.

The shaft of femur is gently convex in front and the convexity is maximal in the middle one third where the shaft is narrowest. The lower end of femur is enlarged to form the medial and lateral condyles which form the knee joint by articulating with patella and tibia. Both condyles project

backwards separated by intercondylar fossa. The lateral condyle is more massive but bulges with less prominence than the medial condyle, because it bears the larger share of weight transmission.

The aim of our study was to evaluate various parameters of femur and especially to correlate anteversion angle and neck shaft angle to help design/modify hip prosthesis. This study was done on femora of north Indian population only. Total of 100 unpaired dry femora, 50 each of left and right side were studied and the result and conclusions drawn are as under.

Result and discussion

The range of the femur length in our study is 367-472 mm, the mean length being 425.11 mm on the right and 433.85 mm on the left. These values are significant with p value of <0.1 and consistent with Maruyama et al (2001) and (Genoves). This value is lesser than the mean for Americans and greater than that of Brazilians both measured in various studies in literature. This disparity is accounted for by racial variation.

The mean bicondylar length is 423.32mm on right and 432.37 mm on left side. This correlates well with the study done by Trotter and Peterson (1967). This was even statically significant with p value being <0.05

The mean of epicondylar breadth was 17.14 mm and 17.43 mm on right and left respectively. P value obtained was >0.10 and hence not statistically significant. Yoshika et al (1987) did study the epicondylar breadth in both sexes separately and values obtained were 90 mm in males and 80 mm in females. In our study femora were not differentiated on the basis of sex.

The mean head diameter of 39.50 mm on right and 40.11 mm on left were similar to that of Isaac et al (1997), Kate BR (1964). This was also not statistically significant with p value of >0.10

The transverse midshaft diameter of 21.14 mm was seen on right and 1.53 mm on left side. The anteroposterior midshaft diameter is 22.552 mm on right and 22.77 mm on left side. The values are lower as compared to values quoted by Ziylan et al (2001) in their study on antonian population.

The range of neck length was 18-33 mm mean being 23.16 on right and 23.26 on left. The values are comparable to study done by de silva et al (2003).

The neck shaft angle has been measured on dry bones by goniometer and also by different methods an roentgenography, USG and CT SCAN. The range was 119° - 138° mean being 131.2° and 132.28° on right and left side. The values are consistent with those given by Yoshilka et al (1987) and Ziylan (2001).

The range of angle of anteversion is 8° - 24° mean being 15.72° on right side and 14° on left side. Patil et al whose method of measuring was similar to ours had the comparable values 10.543° on right side and 12.38° on the left side. The values are in accord with Moulton and Upadhyay (15.38)

Isaac et al (1997) had found out a positive correlation between femoral length and neck shaft angle but in our study femoral length correlated with maximum head diameter. Head diameter and femur neck length were found to be directly proportional to the femur length. This knowledge could be useful guide to orthopaedic surgeons.

The length of the femur could be calculated by using the regression equation-

Total Femur Length = $189.34 + 4.12 (\text{MHD}) + 2.47 (\text{AMD}) + 0.87 (\text{FNL})$

MHD=maximum head diameter

AMD=anteroposterior midshaft diameter

FNL=femur neck length

The means of the midshaft circumference were 78.58 mm on right and 79.40 on left. These values are consistent with the study done by Chhabra et al (1989) in rohtak.

Our data demonstrated asymmetry in bones in Indian population with greater neck shaft angle and neck length on the left side than on the right side.

The overall goal of this study was to generate information that would be useful for geometric modelling of femora and collecting data that would be useful for development of prosthesis. In cases where destruction of femora is extensive, due to trauma or some disease, the data may be helpful for sizing the replacement and reconstructing the normal alignment. We hope this attempt of ours gains theoretical and practical importance in coming years.

Acknowledgement

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Valproate-induced subclinical hypothyroidism

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Abstract

Introduction: Sodium valproate (VPA) is widely used for the treatment of partial and generalized epilepsy in childhood and adolescence. The results of the studies that have evaluated the effect of VPA monotherapy on thyroid function in epileptic patients are controversial.

Objective: Studies on the effects of sodium valproate on thyroid hormone balance in patients with epilepsy are conflicting. The aim of this study was to prospectively evaluate the changes in thyroid profile in epilepsy treated with valproate monotherapy.

Methods: Serum level of triiodothyronine (T3), thyroxine (T4) and thyroid stimulating hormone (TSH) were determined in 40 epileptic patients of valproate monotherapy by EIA method.

Results: Epileptic patients had slightly decreased triiodothyronine (T3) and thyroxine (T4), whereas TSH level was significantly increased on valproate monotherapy.

Conclusion: The results showed that valproate may induce subclinical hypothyroidism. This suggests a need for careful monitoring of serum TSH level in epileptic patients receiving valproate drug.

Keywords

Antiepileptic drugs (AEDs), Epilepsy, Thyroid hormones, Endocrinological system, Subclinical hypothyroidism, Valproate (VPA).

Introduction

The drug treatment of epilepsy poses considerable problems, including the high prevalence and early age of onset of seizures, the relatively poor prognosis in many patients, prolonged polypharmacy, chronic toxicity, and uncertainty of the relative efficacy of individual drugs. In new referrals, there is considerable potential for monotherapy. Reduction in polypharmacy in chronic patients is more difficult, but in many can be achieved with reduction in toxicity, and sometime improved seizure control. Endocrinologic disorders, such as thyroid dysfunction, may be comorbidities in patients with epilepsy. The choice of medication should address such comorbidities wherever possible. Enzyme-inducing antiepileptic drugs (AEDs) such as carbamazepine, phenytoin, barbiturates, and oxcarbazepine among the new AEDs, may reduce the levels of free and total thyroxine^{1,2}. However, clinically relevant thyroid dysfunction owing to AED treatment is rare. Nevertheless, there are now better alternative AEDs (Valproate) with similar efficacy to the classic first-line drugs but without their enzyme-inducing properties. Such drugs should be considered in cases of thyroid dysfunction to reduce the likelihood of iatrogenic adverse effects³. Valproic acid, valproate sodium, and divalproex belong

to the group of medicines called anticonvulsants. They are used to control certain types of seizures in the treatment of epilepsy. Valproic acid, valproate sodium, and divalproex may be used alone or with other seizure medicine⁴. Divalproex is also used to treat the manic phase of bipolar disorder (manic-depressive illness), and to help prevent migraine headaches⁵. Divalproex and valproate sodium form valproic acid in the body. These drugs are related to various adverse effects involving several organs and endocrinological and metabolic functions⁶. In particular, relevant effects on thyroid function have been described^{7,8}. Subclinical hypothyroidism and alterations in thyroid hormone serum levels are reported in the literature; phenytoin, valproate and carbamazepine, in particular, seem to be involved in these alterations^{9,10}. Sufficient data on some of the new AEDs to support this hypothesis are, however, still lacking and urgently needed. Several reports have pointed out the possible negative impact of valproate on thyroid function. The aim of this review is to analyze critically the principal alterations in thyroid function caused by VPA therapy.

Material and methods

Forty cases of epilepsy both male and female which had been on valproate monotherapy, attending all clinical departments of Saraswathi Institute of Medical Sciences Hapur, Ghaziabad, U.P., India, from, March 2009 to May 2010 were selected for the present study. Detailed clinical history and physical examination was done of every patient. Patients suffering with diabetes mellitus, nephritic syndrome, myxoedema and familial hypercholesterolemia, obesity and menstrual disorder, which might affect thyroid hormones, were excluded. Forty healthy individuals preferably relatives of patients were selected to serve as normal control. After an overnight fast of 14-16 hours, 5ml blood samples of patient and control were collected in vacuum tubes and allowed to clot at room temperature for 60-120 minute followed by centrifugation at 3000 g for 10 min. at 40C. Serum was stored at -20C, for estimation of thyroid hormones T3, T4 and TSH by EIA method¹¹, kits were supplied by span diagnostics.

Estimation of serum T3 and T4

The assay was based on a competitive reaction principle. After separating T3 and T4 from its carrier protein TBG (Thyroxine Binding Globulin), thyroxine binding pre-albumin, albumin using 8-Anilino-1-Naphthalene Sulfonic acid (ANS) and sodium salicylate, the assay was performed in two steps:

- A. Immunological steps:
- B. Enzymatic step:

In immunological step 100 μ l of standard, control, sample and 400 μ l of conjugate solution were added in ant-T3 and T4 tubes and incubated 2 hours at 18-25C in the dark. Liquid was aspirated from each tube. After this working wash solution was rapidly dispensed in a series of 48 tubes, it was immediately aspirated and washing procedure was repeated thoroughly.

In enzymatic step 500 μ l of color working solution were added in all tubes including EIA reagent blank tube. After this all tubes were incubated for 30 minute at 18-25C in dark. In last 2ml of stopping reagent were added in all EIA tubes.

The mean absorbances of each standard were read at

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492nm against the reagent blank. These values were plotted on graph paper and a curve was drawn. Mean absorbance was calculated for each sample. The concentration of T3 and T4 were read on the curve.

Results

The study was conducted on 40 patients (28 male and 12 female) of different age group who were on valproate monotherapy for at least 1 year. 40 healthy age and sex matched individuals served as control.

Table 1: Distribution of patients according to age

Age group (Years)	No of patients	Percentage
Less than 10	02	5.0%
10-19	20	50.0%
20-29	13	32.5%
30-39	03	7.5%
40 and above	02	5.0%
Total	40	100%

Table no-1 shows the distribution of patients according to age group. The result shows maximum patients (20) 50% were in the age group of 10-19 years followed by (13) 32.5% were in age group of 20-29 years, while the least (02) 5% were in age group of less than 10 years and 40 years above.

Table 2: Distribution of patients according to duration of valproate drug therapy

Duration of therapy(Years)	No of patients	Percentage
1-3	27	67.5%
4-6	08	20.0%
7-10	05	12.5%
Total	40	100.0%

Table no-2 shows the distribution of patients according to duration of valproate therapy. The result shows maximum patients (27) 67.5% were on 1-3 years of therapy followed by (08)20% were on 4-6 years, while the least (05) 12.5% were on 7-10 years of valproate drugs therapy.

Table 3: Thyroid hormones concentration in patients receiving valproate and in control

Serum concentration	Valproate (no=40) mean \pm S.D.	Control (no=40) mean \pm S.D.	P value
T3 nmol/l	1.58 \pm 0.37	1.73 \pm 0.27	<0.001
T4 nmol/l	70.98 \pm 14.96	84.39 \pm 15.18	<0.001
TSH mIU/L	5.45 \pm 1.26	2.96 \pm 0.64	<0.001

Table no-3 shows level of serum T3 and T4 in epileptic patients on valproate monotherapy were slightly decreased 1.58 \pm 0.37 nmol/l and, 70.98 \pm 14.96 nmol/l and serum TSH was significantly increased 5.45 \pm 1.26 mIU/L as compared to control p<0.001.

Table 4: Relationship between thyroid hormones concentration and the duration of valproate monotherapy

Duration of therapy(years)	No of patients	Serum T3 concentration (nmol/l)	Serum T4 concentration (nmol/l)	Serum TSH concentration (mIU/L)
A. 1-3	27 mean \pm S.D.	1.63 \pm 0.38	76.36 \pm 15.13	5.59 \pm 1.33
B. 4-6	08 mean \pm S.D.	1.49 \pm 0.36	61.57 \pm 14.55	5.23 \pm 1.22
C. 7-10	05 mean \pm S.D.	1.44 \pm 0.35	57.05 \pm 14.62	5.05 \pm 1.25

Table no-4 shows that out of 40 patients of epilepsy, 27 were on 1-3 years (group A) of valproate therapy, 08 were on 4-6 years (group B) and 05 patients with 7-10 years were included in group C. The result shows level of serum T3 and T4 were slightly decreased and TSH was significantly increased up to 6 years of long term valproate monotherapy and beyond this there were no significant change in thyroid hormones.

COMPARISON BETWEEN

A&B	p value	<0.001	<0.001	<0.001
B&C	p value	N.S.	N.S.	N.S.
A&C	p value	<0.001	<0.001	<0.001

Discussion

Epilepsy (excluding fibrile convulsions) is very common. The most recent epidemiological studies suggest a prevalence of 6.5-6.9 per thousand in Europe and USA¹². It is probable that prevalence is higher in underdeveloped countries because of the higher prevalence of antecedent factors such as brain infection and prenatal trauma¹³, but reliable figures are not available. Although epilepsy can and dose being at any age it is predominantly a disorder of early life, some three-quarters of cases beginning in childhood and adolescence¹⁴. The present study was carried out from March 2009 to May 2010 on forty patients (28 male and 12 female) of epilepsy, attending OPD of all clinical departments at Saraswathi Institute of Medical Sciences Hapur, Ghaziabad UP India. Antiepileptic drug (AED) treatment is associated with multiple short- and long-term side effects. Effects on endocrine function, including weight change, reproductive function, thyroid function, and bone health are examples of these side effects¹⁵. Some AEDs affect weight, resulting in weight gain or loss. Levetiracetam and lamotrigine are weight-neutral agents, whereas valproate is associated with weight gain¹⁶. Reproductive dysfunction is reported in women¹⁷ and men with epilepsy treated with AEDs¹⁸. In women, the most common symptoms are hyperandrogenism, menstrual disorders with ovulatory failure, polycystic ovary-appearing ovaries or polycystic ovary syndrome, and hyperinsulinemia¹⁹. These symptoms may be secondary to epilepsy or to AED treatment, particularly with valproate. Valproate (VPA), which was the first marketed in France over 30 years ago, has become one of the leading drugs for the treatment of various forms of epilepsy. It was recently approved for other indications, including mood disorders and migraine²⁰. VPA is probably now the AED with the best-investigated array of adverse effects, some frequent, some predictable and mostly benign, others rare and potentially severe. Many studies reported altered thyroid function (particularly low FT4) among patients with epilepsy during treatment with VPA, but the results were controversial: normal or elevated serum levels of thyroid hormones and TSH have been reported^{21,22,23}. Therefore it seems that these changes are inconsistent; although subclinical peripheral hypothyroidism in children²⁴ and slightly increased TSH with normal FT4 and T4 in girls have been reported. Other studies showed that thyroid hormones and TSH concentrations in a group of men on VPA therapy were normal and VPA seemed not to have significant effects on thyroid function^{25,26}. Many studies documented that these changes were reversed after discontinuation of VPA²⁷. The association of hypothyroidism

with drugs like lithium, amiodarone, and iodine is well established in the literature. Antiepileptic drugs, however, have been recently added to the list. Sodium valproate is commonly used in the treatment of epilepsy and bipolar disorder. It acts by destroying gamma amino butyric acid (GABA) antagonist thereby increasing the levels of GABA, which is said to have an antimanic effect²⁸. Studies in children undergoing long-term valproate therapy have shown a significantly higher level of TSH compared to controls²⁹. Higher levels of TSH, with normal T3 and T4, were also seen in girls undergoing valproate monotherapy³⁰. Contradictory to this, some reports suggest that though antiepileptic drugs like carbamazepine and phenytoin have been found to induce hypothyroidism—due to their hepatic enzyme induction properties which lead to increased clearance of thyroid hormones—valproate did not seem to have the same effect on thyroid function as it was not a hepatic enzyme inducer³¹.

As our patients presented with excessive fatigue, we evaluated thyroid function tests, which revealed a subclinical hypothyroid state. The patients had no history of radioiodine therapy or any surgical procedure which might have accounted for this clinical state. The patients had negative antithyroid antibody screens ruling out autoimmune causes, we attribute the hypothyroid state of our patients to long-term valproate therapy.

Conclusion

We studied serum thyroid hormones (Total Thyroxin, Triiodothyronine Thyroid-Stimulating hormone) levels in patients with epilepsy who had been receiving long-term valproate (VPA) therapy in order to determine whether there was any effect of VPA therapy on these hormones. The study included 40 patients with epilepsy receiving VPA and 40 healthy age-matched controls. The duration of VPA use was between 1 year and 10 years. When comparing the results, we find slightly decreased serum levels thyroid hormones T3, T4 and increased TSH in patients receiving valproate therapy as compared to control group. Thus it could be concluded that the long-term use of valproate monotherapy causes subclinical hypothyroidism and increase with duration of therapy. This is suggested that TSH should be examined in epileptic patients given long-term treatment with valproate.

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Date rape drugs and its detection in alleged victim

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Abstract

Date rape is forced or coerced sex between; partners, dates, friends, friends of friends or general acquaintances. As there are many cases coming to lime light day by day, a quick overview of the common drugs and what specimen can be collected at what point of time is discussed in this paper.

Keywords

Date rape; Drugs; Specimen.

Introduction

Drug-facilitated sexual assault (DFSA), or "date rape" is the surreptitious administration of a drug, usually in a beverage, for the purpose of facilitating nonconsensual sexual intercourse [1].

Date rape is most prevalent in the late teens and early twenties age group.[2] A recent study on the subject of date rape reported that women between the ages of 16 and 24 experience rape at rates four times higher than the assault rate for all women.[3]

Alcohol is just one of many drugs used to facilitate rape. Others include marijuana, cocaine, benzodiazepines, barbiturates, chloral hydrate, methaqualone ("quaaludes"), heroin, morphine, and LSD. Rohypnol, gamma hydroxybutyrate ("GHB"), and ketamine are the three drugs that are used extensively nowadays. The drug sildenafil and, more recently, tadalafil and vardenafil, has drawn public attention to aphrodisiacs.

Drugs used
Alcohol
Alprazolam
Barbiturates
Benzodiazepines
1,4 Butanediol
̑- Butyrolactone
Cannabis
Chloral hydrate
Clonazepam
Cocaine
Diazepam
Flunitrazepam
̑- Hydroxybutyrate
Ketamine
Meprobramate
Methaqualone
Midazolam
Vardenafil
Tadalafil
Sildenafil

Overview of commonly used drugs

Rohypnol (flunitrazepam)

They are classified under benzodiazepines. Family of sedative-hypnotic drugs is used to treat anxiety, convulsions,

muscle tension, and sleep disorders. Rohypnol is 10 times more potent than the most commonly known benzodiazepine, Valium.

Virtually all effects of the benzodiazepines result from their actions on the CNS. The most prominent of these effects are sedation, hypnosis, decreased anxiety, muscle relaxation, anterograde amnesia, and anticonvulsant activity. Benzodiazepines are believed to exert most of their effects by interacting with inhibitory neurotransmitter receptors directly activated by GABA. GABA receptors are membrane-bound proteins that can be divided into two major subtypes: GABA_A and GABA_B receptors.

Bioavailability of drug is 64 -77% by oral ingestion. Mostly metabolized in liver. Has a half life of 18 – 26 hours. Excreted through renal system.[4]

Gamma-Hydroxybutyric acid

̑-Hydroxybutyric acid (GHB), also known as 4-hydroxybutanoic acid and sodium oxybate, is a naturally occurring substance found in the central nervous system. GHB has been used in a medical setting as a general anesthetic, to treat conditions such as insomnia, clinical depression, narcolepsy, and alcoholism, and to improve athletic performance.

Oral bioavailability is 25%. Metabolized, mainly in liver 95%, and to a lesser extent in blood and tissues. Half life is 30 -60 minutes. 5% is excreted by renal system.[5]

Ketamine

Ketamine is an arylcyclohexylamine, a congener of phencyclidine. It is supplied as a racemic mixture even though the S-isomer is more potent with fewer side effects. Although more lipophilic than thiopental, ketamine is water soluble.

Ketamine is hepatically metabolized to norketamine, which has reduced CNS activity; norketamine is further metabolized and excreted in urine (more than 90%)and bile. Ketamine has a large volume of distribution and rapid clearance that make it suitable for continuous infusion without the drastic lengthening in duration of action seen with thiopental. Half life is 2.5 – 3 hours.

What specimens to be collected?

The drug Rohypnol is metabolized quickly and is eliminated from the body within 60 to 72 hours after ingestion. Several methods of detecting Rohypnol are now available for sexual assault victims in cases where Rohypnol involvement is suspected. A urine test can detect Rohypnol up to 72 hours after ingestion. A new method is being developed in which a single 2-milligram dose of Rohypnol can be detected in a hair sample up to 28 days after ingestion.[6] Initial studies with this method of detection are promising.

Analytical tests that can detect GHB levels in blood, urine, or even hair samples after ingestion of the drug. In order to reliably detect GHB in blood or urine samples, testing must be done shortly after the ingestion of GHB, usually within 24 hours. GHB remains in the urine for approximately 12 hours, thus placing a victim who makes a delayed report of rape at a

significant disadvantage. Similarly, Rohypnol remains in the urine for only about 48 to 96 hours, providing just a slightly longer window for testing.

If an overdose of ketamine is suspected, it is possible to test for the presence of the drug in urine, blood, and hair samples. However, both standard and extended drug tests do not routinely test for ketamine. Unless there is a particular reason to be looking for it, medical personnel do not request specific ketamine tests. It is not one of the five drugs (marijuana, opioids, cocaine, amphetamines, and PCP) that are included in standard and extended drug tests. If testing for ketamine is requested, the breakdown product of ketamine, called norketamine, is detectable in both blood and urine for 7 to 14 days after a single administration. Because of their similarities in chemical structure, ketamine may cause false positives for PCP on some drug screens. However, more sensitive follow-up testing can clearly distinguish between the two drugs. This was a more significant issue before 1999, when ketamine was not an illegal substance.[7]

Conclusion

Though the term "Date rape" is widely used "Drug facilitated assault" seems more appropriate as the perpetrator might not be dating the victim. It could be just an acquaintance.

These drugs are also used to help people to commit other crimes as well.

Even if consent had been obtained for sexual act, it is still rape as the victim was under the influence of the drug.

A new trend in using these drug is to add, Progesterone to avoid pregnancy, which causes permanent sterility.

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Clinical anatomy of great cardiac vein and triangle of Brocq and Mouchet

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Abstract

The aim of this work is to determine morphological and topographical aspects of great cardiac vein, especially its relation to the branches of left coronary artery. Examination of the great cardiac vein, left coronary artery and its branches was carried out on 45 specimens of hearts of both sexes aged between 18-50 years and without any known history of changes in cardiac pathology. The techniques applied by us were retrograde injection of great cardiac vein with ink and gelatin mixture followed by anatomical dissection of great cardiac vein, left coronary artery and its branches. The topography and morphology of great cardiac vein and its correlation with branches of left coronary artery as well as triangle of Brocq and Mouchet formed by them were examined and then clinical significance determined.

Keywords

Human hearts, great cardiac vein, triangle of brocq and mouchet.

Introduction

The great cardiac vein (GCV) is the longest vein of the heart and supplies the greatest inflow of the coronary sinus. Normally great cardiac vein originates in the sterno-costal surface near the apex of the heart, from where it runs through the anterior interventricular sulcus to the base of the heart¹. The first part, which is situated in the anterior interventricular sulcus and which accompanies the anterior interventricular branch of the left coronary artery (LCA), is called the anterior interventricular vein². Circling the pulmonary surface of the heart, great cardiac vein runs in the coronary sulcus, passing into the left end of the coronary sinus on the diaphragmatic surface of heart.

The clinical implication of great cardiac vein in topography and morphology include vulnerability in cardiologic procedures, interpretation of diagnostic radiologic images, and the appropriateness of the anatomy for catheter – based interventions. The latter is particularly important because the number of these procedures may increase substantially in the future³.

The aim of this work is to examine variability of the course and morphology of great cardiac vein as well as its correlations with the anterior interventricular and circumflex (Cx) branches of the left coronary artery. These relationships results from the arteriovenous triangle of Brocq and Mouchet, which has been classified by Pejkoovic and Bogdanovic⁴ as open or closed.

Material and methods

Examination was made of 45 preparations of human hearts from cadavers of both sexes aged between 18-50 years. Hearts weighing more than 370 gms in males and 230 gms in females were not included in this study to exclude pathological conditions⁵. The specimens for this study were obtained from medico- legal autopsies done in the Department of Forensic Medicine, Pt B.D. Sharma Post Graduate Institute of Medical Sciences, Rohtak.

The great cardiac veins of the obtained specimens were injected with ink and gelatin mixture^{4,6}. Then, the preparations were fixed by immersion in 10% formaldehyde solution for at least seven days. Routine anatomical dissection of great cardiac vein, left coronary artery and its branches was carried out. The morphology and variability of course as well as correlations between great cardiac vein, left coronary artery and its branches, triangle of brocq and mouchet were examined.

Observation

The great cardiac vein was observed to be present in all cases i.e. 100% cases. Table 1 shows morphological features regarding great cardiac vein.

Great cardiac vein originated in lower third of anterior interventricular groove in 22/45 cases i.e. 48.88% cases. In 16 cases (35.55%) it began at apex of heart. In two cases (4.44%) it took origin at junction of upper and lower half of anterior interventricular groove. In one case (2.22%) the great cardiac vein originated in lower part of posterior interventricular groove, and then turned on the apex to run into anterior interventricular groove. In three cases (6.66%) it formed venous ring with middle cardiac vein and in one case (2.22%) venous ring with left marginal vein.

In anterior interventricular groove great cardiac vein was always accompanied by left anterior descending (LAD) branch of left coronary artery, lying parallel and to the left of the artery in 40 cases (88.88%) and lying parallel and to the right of the artery in remaining five cases (11.11%). The GCV, along with the Cx and the anterior interventricular branches of the LCA, form the arteriovenous triangle described as the Brocq and Mouchet triangle, the base of which is created by GCV in 33/45 (73.33%) cases. The morphological features regarding this triangle are shown in Table 2.

In 19 cases (57.57%) the triangle was observed to be "open" (figure 1). In 14 cases (42.42%) it was observed to be "close" (figure2).

Left view of heart showing triangle of Brocq and Mouchet 'open' inferiorly to right (arrow). 1 – Left coronary artery stem, 2 – Anterior interventricular artery, 3 – Circumflex artery, 4 – Great cardiac vein.

Left view of heart showing 'close' type of triangle of Brocq and Mouchet.

1 – Left coronary artery stem, 2 – Anterior interventricular artery, 3 – Circumflex artery, 4 – Great cardiac vein.

While turning from anterior interventricular groove to the atrioventricular groove i.e. in the region of triangle of brocq and mouchet, the vein crossed superficial to LAD as well as Cx branch of LCA in 22 cases (48.88%). The vein crossed superficial to LAD and deep to Cx artery in 4 cases (8.88%) and vice versa in another 4 cases (8.88%). It crossed deep to both arteries in only three cases (6.66%). In 12 cases (26.66%) the triangle was not present and great cardiac vein did not cross any of the arteries.

Myocardial bridges were observed in 5 cases (11.11%). The length of these bridges was observed to range between 8-18 mm.

Table 1: Morphological features of great cardiac vein (n=45)

S. NO.	FEATURE	NO. OF CASES	PERCENTAGE
1.	Incidence of presence	45	100
2.	Number		
	Single	45	100
	Double	-	-
3.	Myocardial bridges	5	11.11
4.	Tributaries		
	Left Marginal Vein	40	88.88
	Posterior Vein of Left Ventricle	10	22.22
5.	Draining into Coronary Sinus	45	100

Table 2: Morphological features of triangle of brocq and mouchet (n=33)

S. NO.	FEATURE	NO. OF CASES	PERCENTAGE
1.	Open		
	Open to right inferiorly		
	Open to left inferiorly		
	Fully open inferiorly	19130402	57.5728.8839.396.06
2.	Closed	14	42.42

Figure 1 :**Figure 2 :**

Discussion

In the present study great cardiac vein was present in all the cases (100%) draining into coronary sinus. This finding is consistent with the previous studies⁷⁻¹⁰.

In a study by Kaczmarek (2007)¹⁰ it was found that in 41% cases GCV originated in the lower third of the anterior interventricular sulcus. In each of 17% cases it took origin from middle third and superior third of the anterior interventricular sulcus. In 9 cases (25%) GCV united at the apex of the heart with middle cardiac vein (MCV), forming a large venous arc. PejkoVIC and Bogdanovic (1992)⁴ and Ortale et al (2001)⁹ found that in 58% cases GCV took origin at the lower third of anterior interventricular sulcus or at middle third of the sulcus in 20% cases. In 9% cases it began at the apex of the heart. In 13% cases great cardiac vein formed a venous ring with middle cardiac vein. In a few cases PejkoVIC and Bogdanovic (1992)⁴ found a "double" great cardiac vein. The findings of the present study were mostly consistent to their results. In the present study, GCV was always single. However, in one case GCV began at lower part of posterior interventricular sulcus, and then turned the apex of heart to run into anterior interventricular sulcus. This pattern of great cardiac vein has not been reported in available literature. Interestingly in one case GCV formed venous ring with left marginal vein (LMV). Such a venous ring formed by GCV and LMV has not been reported earlier.

In anterior interventricular sulcus GCV was accompanied by the left anterior descending branch of LCA in the previous studies^{4,9,10} as well as in the present study. In the present study GCV was frequently found to the left of its related artery, being in agreement with the previously reported data⁹⁻¹². However, in one previous study⁴ it has been reported that the GCV coursed most often to the right of its related artery.

Triangle of brocq and mouchet was found to exist in 73.5%

cases studied in the present research. A higher percentage has been reported by previous workers^{4, 8-10}. In agreement with findings of these previous workers, in cases where this triangle was absent, the great cardiac vein ran up to the bifurcation of left coronary artery before it continued into atrioventricular sulcus. In accordance to the previous studies^{4,9,10} the topography as well as morphology of this triangle was found to be very variable. In the research by PejkoVIC and Bogdanovic (1992)⁴ GCV ran most often on right side of the anterior interventricular branch of LCA, forming a closed triangle. In our study GCV ran most often on left side forming an open triangle. In agreement with previous workers^{4, 7-9, 11} the GCV was found to cross LAD or Cx or both branches of LCA superficially in majority of cases in the region of the triangle.

Intramyocardial course of GCV was found in two studies^{4, 12} in 2% cases ranging between 2-10 mm. Two other studies^{7, 9} found them in 5% cases ranging from a few mm to about half a cm. In the present study myocardial bridges over GCV were found in about 10% cases ranging between 8-18 mm. The intra myocardial course of this vein could indicate dysrhythmia^{4,9,11}.

With respect to injury, great cardiac vein is vulnerable by virtue of its location and proximity to the circumflex artery, which is frequently injured by surgery to the left auricle¹³. Also particular variations of GCV may be a factor in tears and their repair in internal trauma¹⁴. Therefore, there is a need for acquisition of detailed cardiac vein anatomy and arteriovenous relationships for new strategies in interventional cardiology¹⁵.

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The application of problem sessions in a hybrid instruction design within the forensic medicine and clinical toxicology curriculum: The Ain Shams experience

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Abstract

Context

Using problem sessions as a method of instruction and incorporating it into the body of the curricula, as a hybrid instruction design is not as well established as PBL.

Objective

This study aims at studying the effect of the hybrid curriculum design using problem session on the learning process within the forensic medicine and clinical toxicology curriculum and studying the acceptability of the method between the students.

Methods

A redesign of the instruction plan was introduced in the academic year 2008-2009 to be problem oriented. Student scores in the final exam were analyzed and compared with the previous year. 100 students randomly chosen answered a questionnaire.

Findings

There is a significant elevation of the success rate in the end of year exams after using the new instruction design. 81% of the students expressed their appreciation of the problem-oriented sessions. Meanwhile 31% of students thought that having three weekly sessions to discuss the problem was too much.

Conclusion

Using problems as an instruction method in the forensic medicine and clinical toxicology curriculum could be a beneficial method of instruction.

Keywords

Undergraduate, Instruction design, problem based learning, outcome analysis.

Context

According to the FAIMER report¹, problem based learning has been proven to escalate the student's capacity for active and self-directed learning. It also generates a student that is confident and professionally fluent. It also focuses more on acquiring skills than knowledge. It is also more fun and encourages the student to practice critical thinking. There is also an implication that the graduates of this system are thought to be more competent. It is known to encourage teamwork, listening, presentation skills and critical literature evaluation.²

The Idea

It is proven that PBL produces a graduate that possesses

stronger personal skills and is better aware of the implication of the subject matter on his daily practice as a physician. The benefit of the student interaction as well as the self directed learning involved in the process is very entreeing. As an educator we always tend to want the best for our students and it is rather difficult to let them go unrefined when we have the tool that can transform their abilities and improve the outcome. The problem is that PBL is a whole integrated system that requires a complete integration within the program. It is rather discouraging for schools especially traditional schools. Neame & Powers, in an article titled "Assisting Students to Learn How to Learn," concluded "It is impractical to suggest that an unstructured, undergraduate medical course be designed in which the onus is entirely upon the student to define and undertake his own program of studies." What these authors recommended was a gradual progression towards independent learning, via a graded reduction of imposed structure.³ This is how the idea evolved to restructure the individual curriculum design of the forensic medicine and toxicology to be in itself a unit with problem centered instruction. This approach utilizes problem discussion sessions as a teaching and learning method. This idea was predicted for by Camp⁴ in 1996 as an innovative step to follow the outburst of PBL in medical schools.

Methods

Before starting the academic year faculty and assistants were trained on tutoring and facilitation of problem sessions based on the recommendation within the Vassilas et al. study in 2003⁵. The entire instruction plan of Forensic Medicine and clinical toxicology for fourth year medical students was redirected to accommodate a weekly problem session at the beginning of the week, a follow up session in the middle of the week and a discussion session at the end of the week. Out of the instruction time, this covered 10%.

Facilitation of the problem sessions was conducted by faculty members where junior staff (demonstrators) who are still not really comfortable with the subject matter were assigned to the first problem session of the week, junior faculty were assigned to the second week session and the senior faculty were assigned to the end of week session.

The rest of the week was planned to incorporate the rest of the learning methods; 10% in the form of lectures, 40% practical sessions, and 40% small group discussions. All instruction methods of the week were planned and tailored around a single theme. The forensic medicine and toxicology curriculum was organized around eight case based themes. The use of hybrid curricular design using problems that do not cut between subjects is a method used by other medical schools.⁶

Students spend a two-month period in the department during which they are required to cover the curriculum. This is the two month "round" arrangement of the subject matter which is the trend in our school for the three clinical phase teaching years. At the end of the round students sit for their practical exam and the summative assessment is delayed until the end of the year after the student has finished all his clinical rounds.

At the end of the year the students were evaluated in

Table 1: Z Test for comparison of the results of the end of year exam for the year 2007-2008 and the year 2008-2009.

	2007-2008	2008-2009	Z value	P value
Success rate	92%	97 %	6.08	<0.001
Percentage of passing students scoring above 85%	24%	26.5%	1.763	<0.05
Percentage of passing students scoring from 75% to <85%	34%	40.5%	3.22	<0.001
Percentage of passing students scoring from 65% to <75%	36%	24%	6.841	<0.001
Percentage of passing students scoring from 55% to <65%	6%	9%	2.912	<0.001

terms of their knowledge acquisition and grades of that year were compared to the grades of the previous year. The two academic year exams were analyzed and compared to ensure the comparability of the results. 100 students were chosen randomly from the list of attendees for each of the four two-month rounds and were given a questionnaire testing their perception about the experience and its impact on their acceptance and understanding of the subject matter.

Data analysis

Data collected from the final exam and that collected from questionnaire was tabulated and statistically analyzed for significance.

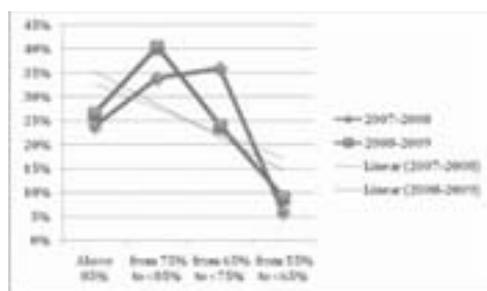
Findings

There appeared to be a significant rise in the percentage of students passing the end of year academic examination held in 2009 when compared to the results of the 2008 examination. This finding is contradictory with the results of impact analysis⁷ conducted after the curricular redesign in Suny Downstate psychiatric center. This could be due to the difference in tested sample size (160) in that study.

When comparing the percentage distribution of students in each of the two batches as regards the achieved grades it was found that there was a significant increase in the percentage of students achieving above 75% and those attaining grades between 55% and 65%. On the other hand there seemed to be a significant drop in the percentage of passing students scoring between 65% and 75%. This is reflected into a change in the distribution of student results when comparing the two academic end-of-year exam scores.

After the introduction of the problem sessions the trend of student grade cluster shows a shift towards the right showing a positive skew curve. This is interpreted into a rise of the mean student score from 103 to 124. This is obvious when compared to the data representation of the results of end of year exam in 2008. (Fig 1) This is understandable in the sense that problem discussion aims at improving the higher intellectual properties and the learning capacities in students. It also encourages self-directed learning. These are all qualities that redirect learning style and improve the quality of learning and increase the mastery of the subject matter. This means that students are given an alternative learning tool that they can benefit from provided that they want to learn. This in turn

Fig. 1: Cluster representation of the student scores in the Forensic medicine and clinical Toxicology Exams for the academic years 2007-2008 and 2008-2009.



is reflected as an improvement of results and raising the achievement ceiling of high achievers rather than create impact on the moderate achievers who are not motivated to use the tool they are given.

81% of the students answering the questionnaire expressed their appreciation of the problem-oriented sessions. 62% thought that it could totally replace didactic lectures. 72% believed that the problem sessions helped them understand the subject matter better. 66% stated that the sessions made them relate more to the concept of forensic medicine and clinical toxicology. 67% stated that the problem sessions helped them realize the relevance of the subject matter to their practice in the future.

On the other hand 31% of students thought that having three weekly sessions to discuss the problem was too much. This is in agreement with the findings in Trappler (2006)⁷. This just reflects that in spite of the acceptance of problem oriented learning by the students yet they still remain more in favor of the more structured instruction tools⁸.

Conclusion

Using problems as an instruction method in the forensic medicine and clinical toxicology curriculum helps students relate the subject matter to their future practice and improve their academic performance.

Recommendations

Applying the problem oriented sessions into other subject matter instruction designs. Reducing the sessions into two weekly sessions would be more convenient for the students.

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Conflict of interest

None declared

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