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Deaths due to Suffocation: A Comprehensive Study

B. Lakshmi Prasanna*, Bharath Kumar Reddy, D. Sridhar***, Nishat Ahmed Sheikh******

Abstract

Background: Suffocation is a general term that encompasses several forms of asphyxia either from lack of gas in the breathable environment, or from obstruction of the external airways (smothering) or the internal airways (choking), or from a pressure on the chest or abdomen or a body position restricting respiratory movement (traumatic and positional asphyxia, respectively). *Study Design:* It's a cross sectional prospective study. *Place of Study:* Mortuary of Osmania general hospital, Hyderabad. *Duration of Study:* 2-year study period 2013-2015. *Material and Method:* out of 9812 autopsies conducted at mortuary of Osmania General Hospital, during two year period 46 cases of suffocations were identified and autopsy was done. *Observation and Discussion:* The most common cause of suffocation is smothering comprising about 39% of the study sample. i.e. 18 cases followed by traumatic and/or positional asphyxia (26%). The least common cause in the study sample is autoerotic asphyxia. Most of the accidental suffocation deaths are associated with alcohol intoxication comprising almost 56.25% of cases, whereas majority of victims of homicidal suffocation deaths are non-alcoholic. Choking as a cause of sudden death has been recognized and well documented since the time of Hippocrates [11] and it is mostly accidental. The chances of choking are higher if the subject is under the influence of alcohol (cafe coronary) as supported by Hangen RK. *Conclusion:* The percentage of suffocation deaths in relation to the total Post Mortem Examination is miniscule i.e. 0.5%, but still it is one of the most important cause of death in terms of its complex mechanism. Suffocation deaths cannot be attributed to a single entity but to a spectrum of smothering, choking, traumatic/positional asphyxia, entrapment/ environmental types of deaths. Further studies on different populations are required, particularly to obtain evidence-based data to support our common body of knowledge and assess the discrepancies with the textbook literature.

Keywords: Asphyxia; Suffocation; Alcohol Intoxication.

Introduction

Suffocation is a type of asphyxial death upon which authors in different textbooks differ in definition and classification. Suffocation is a general term used to indicate death from deprivation of oxygen, either from lack of gas in the breathable environment or from obstruction of the external air passages [1,2].

Suffocation simply stated is deprivation of oxygen in breathable environment. It apparently looks simple, but is one of the most complex causes of death. It perplexes and is a challenge even to forensic medicine expert to come to an accurate diagnosis. Not only is the diagnosis of suffocation deaths very difficult, owing to very minimal findings but also the nature of death in these cases is very complicated and tricky [2,3].

Suffocation deaths can pose considerable difficulties for the Forensic expert to distinguish between accident, suicide and homicide because in many situations, it leaves no specific findings supporting the diagnosis of manner, which mostly relies on the circumstantial evidence or sometimes

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on eyewitness. A clear-cut history is the key to understand suffocation deaths. This will not only help in easing a conclusion at autopsy but also throws a light on preventing them [4].

Suffocation is a general term that encompasses several forms of asphyxia either from lack of gas in the breathable environment, or from obstruction of the external airways (smothering) or the internal airways (choking), or from a pressure on the chest or abdomen or a body position restricting respiratory movement (traumatic and positional asphyxia, respectively) [1,2]. Suffocation from lack of oxygen in the breathable environment can be encountered by re breathing in an air-tight or relatively airtight enclosure (entrapment suffocation), by low atmospheric oxygen in unusual environments (environmental suffocation) or, more commonly, by physical displacement of oxygen by other gases or by chemical changes such as combustion [1,2].

Death from accidental suffocation was considered as any unintentional death reported to Eurostat with an underlying cause of death coded W75 to W84 (Table 1) in the 10th revision of ICD (ICD-10).

Mostly the studies of suffocation deaths were limited to a specific type in the form of case reports, case series and included specific studies such as lethal crush D traumatic asphyxia, suffocation in motor vehicle collisions, fatal entrapments in grain storage bins, café coronary deaths and suffocation by plastic bags. The objective of this paper is to make an analysis of etiology of suffocation deaths, to assess the circumstances leading to suffocation death and to study the mechanism of asphyxia in different types of suffocation deaths. In the present study, the postmortem findings are explained in three categories i.e. external findings, internal findings and petechial hemorrhages.

Materials & Methods

The forensic medicine department of the Osmania general hospital covers over 50,00,000 population of Hyderabad city. It's a cross sectional prospective study. All cases with suffocation as cause of death and of age more than one year, during the study period of two years were analyzed. For each case, the type of suffocation, manner of death, gender, age etc., were studied. During the 2-year study period 2013-2015, a total of 46 suffocation deaths were autopsied in our forensic medicine department. Total 9812 autopsies were conducted in that duration out of those 46 cases was due to suffocation.

All the cases for study were meticulously examined externally and internally at autopsy. Data were collected from relatives, accompanying persons, eyewitnesses, investigating officer and inquest reports. The chemical analysis for alcohol and toxicological reports were incorporated. Scene of Offences were visited. Suffocation associated with other types of major fatal injuries were excluded along with infants as in infant death, it is considered as SIDS rather than death due to any form of suffocation and it is quite impossible for autopsy surgeons to differentiate the two entities and stamp it as an absolute case of suffocation death.

Statistical Analysis

The collected data were analyzed using SPSS version 18 (SPSS Inc., Chicago)

Exclusion Criterion

Deaths due to respiratory tract involvement but not suffocation, below one year infants, inadequate information, and obscure findings from autopsy were excluded from the study.

Observations and Discussion

Analysis of study sample based on data collected suggested that majority of the study sample comprises of male sex of about 67% (31 cases). Males form majority of study sample irrespective of the type of suffocation. Strong male predominance was also observed (M: F=1.47:1), consistent with the study from Canada and India [6,8]. In Turkey, male preponderance was reported in deaths due to asphyxia [9]. The cause may be due to industrial exposure, alcoholism and outdoor activity being more in males. Overall, a strong male predominance was observed, with two-thirds of the victims being men. Males form majority of study sample irrespective of the type of suffocation.

The major age group of deaths due to suffocation is 4th decade of life involving about 1/3 rd of cases, while the least common age group being more than 60 years of age. The minimum age seen in the study sample is 6years and the upper age is 65.

In our study majority of the cases were from lower socioeconomic status and it includes male predominance.

The most common cause of suffocation is smothering comprising about 39% of the study

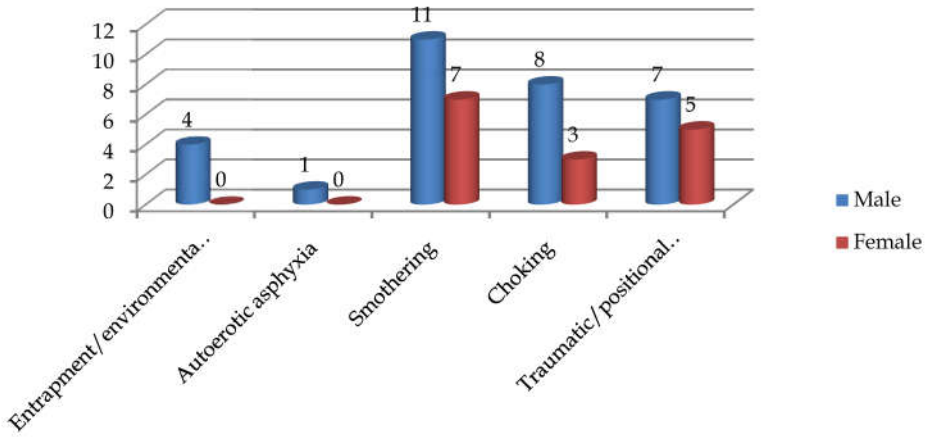

Fig. 1: Distribution of study sample based on type of suffocation and sex

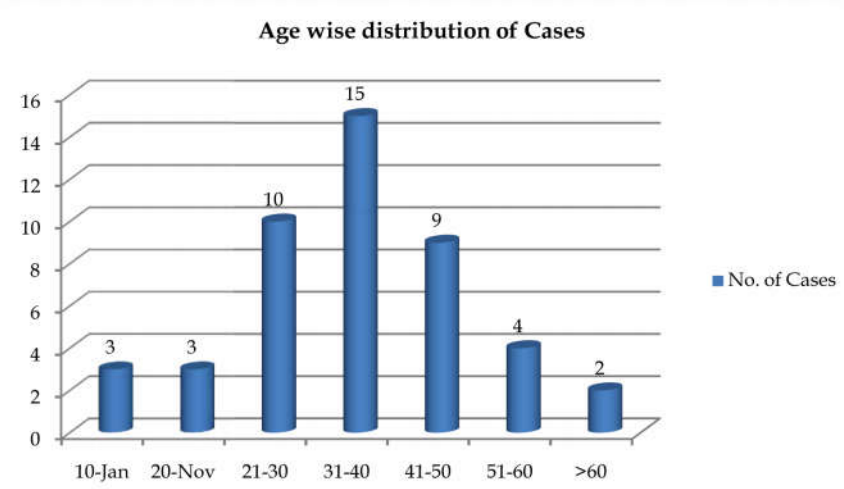

Fig. 2: Age wise distribution of study sample

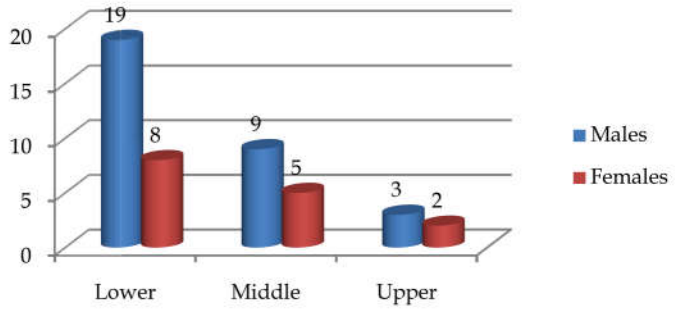

Fig. 3: Distribution of study sample based on socioeconomic status and gender

sample. i.e. 18 cases followed by traumatic and/or positional asphyxia (26%). The least common cause in the study sample is autoerotic asphyxia. Smothering is more often encountered in a homicidal context (66%). This is in contrast to western scenario where smothering is more commonly suicidal (with plastic bag tied around face and neck). All traumatic, environmental, positional asphyxial deaths and majority of choking and two smothering deaths were accidental in nature, similar to the study from Canada [6,7].

Taken as a whole, manner of death in suffocation is generally ruled as accidental (70%). In fact, all entrapment/environmental suffocations and traumatic/positional asphyxia deaths were accidental, so is the case with majority of choking deaths (91%). Smothering, in contrast, is more often encountered in a homicidal context (66%). Most of

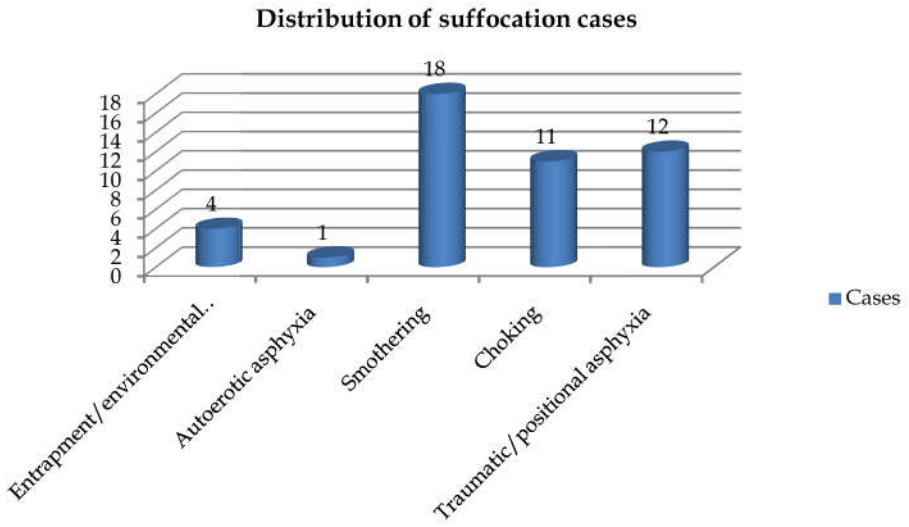

Fig. 4: Distribution of suffocation cases in study sample

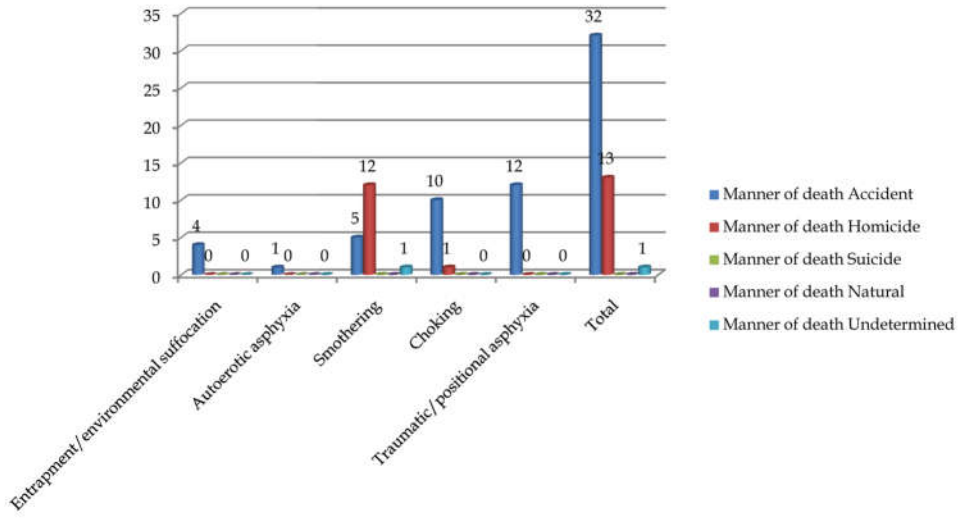

Fig. 5: Distribution of study sample based on type of suffocation and manner of death

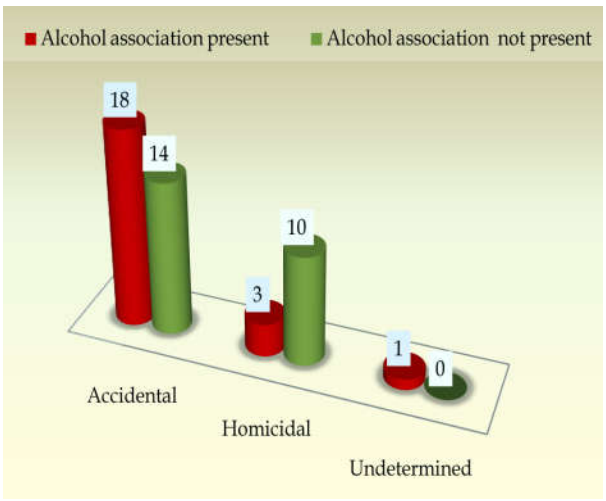

Fig. 6: Alcohol association in relation to Manner of death

the smothering was homicidal (83.33%) in nature but in contrast, Boghossian E et al, observed smothering in a suicidal context (58.62%). Choking as a cause of sudden death has been recognized and well documented since the time of Hippocrates [11] and it is mostly accidental.

Alcohol association is found in choking type of suffocation whereas in other types of suffocation association of alcohol is not significant. Most of the accidental suffocation deaths are associated with alcohol intoxication comprising almost 56.25% of cases, whereas majority of victims of homicidal suffocation deaths are non-alcoholic.

Most of the accidental suffocation deaths are due to traumatic asphyxia grossly related to alcohol intoxication comprising about 37% of total

accidental deaths whereas almost 93% of homicidal suffocation due to smothering are non-alcoholic.

Analysis of study sample indicates that alcohol association is found in choking type of suffocation. Choking as a cause of sudden death has been recognized and well documented since the time of Hippocrates and it is mostly accidental [10,11]. The chances of choking are higher if the subject is under the influence of alcohol (cafe coronary) as supported by Hangen RK [9].

Among the External findings, the most common finding is cyanosis. Among the Internal findings, the most common finding is congestion of internal organs. Petechial hemorrhages are found in external and internal organs. The most common site for Petechial hemorrhages is eyes, followed by brain. The various types of "Suffocation deaths" include Smothering, Choking, entrapment or environmental suffocation, traumatic or positional asphyxia and autoerotic asphyxia.

Over a 9-year period, 30 cases of positional (or postural) asphyxia were identified in the Dade and Broward County (Florida) Medical Examiner Offices[4]. The victims had an average age of 50.6 years with no significant sex or racial differences as compared with the general medical examiner population. Chronic alcoholism or acute alcohol intoxication was a significant risk factor in 75% of cases and these had an average postmortem ethanol concentration of 0.24 g%. The present study also considered the influence of alcohol in the cases that were died due to accidental and homicidal background. The present study also showed that Alcohol association is present in most of the males whereas in females alcohol association is not present in majority of sample. In the present study only one case of Auto erotic asphyxia/sexual asphyxia was found which are significant [3]. In rest of the cases there is no such particular history is found.

Limitations of the Study

The study was done with a small sample and generalization of result cannot be done. The source of data collection was a Government general hospital where the cases of that particular area were referred for autopsy and hence specification of geographical area cannot be done for comparison.

Conclusion

Medico legal autopsies not only give the cause and manner of death but also give important statistical data related to legal incidents in the cities and regions where the autopsies are conducted. It is difficult task for forensic experts and scientific community to find out the exact cause of increasing number of unnatural violent asphyxial death.

The percentage of suffocation deaths in relation to the total Post Mortem Examination is miniscule i.e. 0.5%, but still it is one of the most important cause of death in terms of its complex mechanism. Suffocation deaths cannot be attributed to a single entity but to a spectrum of smothering, choking, traumatic/positional asphyxia, entrapment/ environmental types of deaths. Our research study proved that alcohol has played a key role as circumstantial evidence on suffocation deaths; alcohol played a significant role in mainly in deaths due to choking. The person in an inebriated state; be it victim or offender loses control of one's self-consciousness and conscience and may commit a heinous crime or end his valuable life.

The police should be trained to recognize social problems which may lead to violence at home. Strict enforcement of law against sale of alcohol has to be done and awareness about the hazards of alcohol is to be conveyed to the public. Promote gender and social equality through the social and educational policies. Nonviolent methods of arbitration to resolve the conflicts at all levels possible, should be promoted. To prevent industrial deaths, continuous observation on machineries and other protective measures are required. Further studies on different populations are required, particularly to obtain evidence-based data to support our common body of knowledge and assess the discrepancies with the textbook literature.

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Conflict of Interest

The author declares no conflict of interest in the present study

Author Disclosures

Authors have no conflict of interest. This study was a part of departmental research activities of Forensic Medicine at Kamineni Academy of Medical

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Ethical Consideration

Clearance from the Institutional Ethical committee was obtained in advance.

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Original Article

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An Autopsy Study to Evaluate Time Since Death from Organs Weight and Physical Parameters

Dabhi Dipen M.*, Modi Pikesh M., Varu Pratik R.**, Patel Milind N.***, Arunkumar J.S.***, Mashru Raj K.*****

Abstract

Context: Time since death (TSD) is very important opinion in every post mortem examination. In every case, lawyers will try to exclude the evidences as they are not within range of time since death. *Aims:* To evaluate time since death from decrease in body weight, organs weight, BMI (Body Mass Index) and BSA(Body Surface Area) in percentage. *Methods and Materials:*This isprospective study comprised of 300 cases randomly selected from cadavers brought for autopsy atmortuary of Government Hospital, Rajkot from Jan-2012 to May-2013. Based on time since death, cases are classified as fresh cases having TSD within 6hours, 1-3 days, 3-5 and more than 5 days respectively. Change in body weight, organs weight, BMI and BSAwere studied in these TSD range. *Conclusion:*Changes in body weight, organ weight, BMI and BSA can be used as on table rapid tool to evaluate TSD.

Keywords: TSD(Time Since Death); Organs Weight; Decomposition; BMI (Body Mass Index); BSA (Body Surface Area).

Introduction

Time since death is very important opinion in every case of post mortem examination. It is calculated from various post mortem changes of the body which are grouped as immediate, early and late changes. Cooling of body, rigor mortis, post mortem lividity are common day to day parameters used to estimate TSD in fresh cases. Process of decomposition in accordance with TSD is divided as early decomposition characterised by various post mortem changes like marbling, peeling of epidermis, accumulation of gases etc (18 to 36 hours) and late post mortem changes like adipocere formation (3 weeks to 3months) and mummification (3 months to 1 year). Opinion of TSD is based on combination of post mortem changeswhich are distributed over the range and there is no numerical parameters to decide it.In every case, lawyers will try to exclude the evidences as they are not within range of time since death. Weak opinion regarding TSD will benefit the accused and causes injustice. In this study, an attempt is made to include new numerical parameters like decrease in body weight and organs weight along with post mortem changes to opine about TSD. Differential rate of decomposition of various organs are also studied.

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Material and Method

This study was conducted on 300 subjects randomly selected from cadavers brought for autopsy at mortuary of Government Hospital, Rajkot from Jan-2012 to May-2013. Cases in which organs were injured, bodies having disease affecting body weight or organs weight, having congenital anomalies of organ, and cases in which bodies were mutilated or damaged by creature to any extent were excluded. Brain, heart, lungs, liver, spleen and kidneys were the organs included in this study. Standard autopsy protocol and procedure as described in standard textbooks [1-5] were employed for removal of various organs. The body and organs were weighed using electronic weighing machine. In decomposed cases,

organs were weighed till their architecture was intact. Body length was measured from top of head to heel with measure tape by measuring distance between wooden blocks placed at both ends. BMI [6-7] and BSA [6-7] were the physical parameters that were derived using DuBois formula from Body weight and length.

Accurate TSD was obtained from history of relatives, police papers and post mortem changes. To correlate TSD with body weight and organ weight, we have divided TSD in fresh cases(FC) having TSD within 6hours and decomposed cases with TSD within 1-3days, 3-5days and >5days.

Result and Discussion

Cases are divided by considering TSD as Fresh cases (FC) having TSD within 6hours and decomposed cases with TSD within 1-3days, 3-5days and >5days. Fresh cases are maximum in number (80% of total cases) and values of their physical parameters and organs weight are considered as normal values for adults in Rajkot region. Out of all decomposed cases, maximum number of cases are with TSD within 3-5 days (10%), followed by cases with TSD within 1-3 days (6.4%) and cases with TSD more than 5days(3.6%) (Table 1).

Mean of body weight in fresh cases is considered as normal weight of adult in Rajkot region and is taken as 100%. Its value 59.36Kgs is approximately the same as average weight of adult in Indian population [6-7]. Weight of all organs are also approximately same as normal weight of organs in Indian population [1-5]. As TSD increases, significant decrease in body weight as well in organ weight is noted. They can be used as rapid on table tool to evaluate TSD. Body weight is 61.06% in cases with TSD within 1-3days, 53.97% in cases with TSD within 3-5 days and 42.48% in cases with TSD more than 5 days.

Body length does not shows significant variation with TSD. BMI [6-7] and BSA [6-7] are physical parameters which are dependent on body weight and body length, so they shows changes in accordance with body weight. BMI is 63.59% in cases with TSD within 1-3 days, 54.82% in cases with TSD within 3-5 days and 41.66% in cases with TSD more than 5 days.BSA is 80.24% in cases with TSD within 1-3 days, 76.54% in cases with TSD within 3-5 days and 70.37% in cases with TSD more than 5 days(Table 2).

Out of all organs brain and spleen are the earliest organs to decompose. Weight of brain is not available in cases with TSD ismore than 1day. Weight of spleen is reduced to 50% of its normal values in cases where TSD is within 1-3 days and is not available in cases with TSD>3days. Organs like liver and kidneys decomposes late as compared to organs like brain and spleen and their rate of decomposition is also less. Weight of liver is 60.99% in cases with TSD within1-3days, 48.89% in cases with TSD within 3-5 days and 33.23% in cases with TSD more than 5days.Rate of decomposition of both kidneys are identical. Weight of kidneys are 60% of its normal values in cases with TSD within 1-3days,57% of its normal values in cases with TSD within 3-5days and 50% in cases with TSD more than 5days. Lungs and heart decomposes late in our study. Weight of heart is reduced to 72.95% of its normal values in cases with TSD within 1-3days, 57.48% in cases with TSD within 3-5 days and 47.85% in cases with TSD more than 5days.Rate of decomposition of both lungs are identical. Weight of both lungs are 75% of its normal values in cases with TSD within 1-3 days,63% in cases with TSD within 3-5days and 47% in cases with TSD more than 5days (Table 3).

We could not find any such study for comparison. However, every standard textbook of forensic medicine mentions that the organs composed of muscular tissue and thosecontaining large amount of fibrous tissue resist putrefactionlonger than the parenchymatous organs. We found similar findings in our study. In our study, brain, liver, spleen and kidneys were early t decompose while heart and lungs were late to decompose.

Table 1: Distribution of cases in relation to TSD

TSD (Time since death)	No. of cases	% out of total cases
<6hours (Fresh Cases)	250	80%
1-3 Days	16	6.4%
3-5 Days	25	10%
>5 Days	09	3.6%
Total	300	100%

Table 2: Mean of physical parameters in relation to TSD

TSD	Mean body weight		Mean body length	Mean of BMI		Mean of BSA	
<6hours	59.36 kg	100%	161.32	22.80	100%	1.62	100%
1-3days	36.25 kg	61.06%	158.37	14.50	63.59%	1.30	80.24%
3-5 days	32.04kg	53.97%	160.84	12.5	54.82%	1.24	76.54%
>5 days	25.22kg	42.48%	163.00	9.5	41.66%	1.14	70.37%

Table 3: Mean of organs weight in relation to TSD

Time since death	Mean weight of brain	Mean weight of heart	Mean weight of right lung	Mean weight of left lung	Mean weight of liver	Mean weight of spleen	Mean weight of right kidney	Mean weight of left kidney
Fresh cases	1229.07	303.01	439.12	384.19	1296.32	113.04	127.69	115.28
1-3 days	NA	221.06 (72.95%)	335.00 (76.28%)	288.81 (75.10%)	790.75 (60.99%)	50.75 (44.89%)	76.18 (59.66%)	71.68 (62.71%)
3-5 days	NA	174.20 (57.48%)	277.88 (63.28%)	245.24 (63.83%)	633.88 (48.89%)	NA	73.00 (57.16%)	66.80 (57.94%)
>5 days	NA	145.00 (47.85%)	205.33 (46.57%)	189.11 (49.22%)	430.77 (33.23%)	NA	52.22 (40.895)	47.33 (41.05%)

Conclusion

Decomposition is a process that progresses externally (Body weight) as well as internally (Organ weight) simultaneously. As TSD advances, body weight and organs weight decreases. Out of all physical parameters body weight and BMI show significant decrease with TSD. As BMI is an index which is directly proportional to body weight it shows significant changes in accordance with bodyweight.Brain and spleen decomposes earlier. Brain is completely decomposed in cases with TSD more than 1days. Spleen is reduced to 50% of its normal weight by end of 1day after death and is completely decomposed in cases with TSD more than 3days. Organs like liver and kidneys are next to decompose and their rate of decomposition is less as compared to brain and spleen. Lungs and heart decomposes late as compared to other organs in this study. This differential rates of decomposition of various organs as well as changes in body weight, BMI and BSA can be used as on table tool to evaluate TSD.

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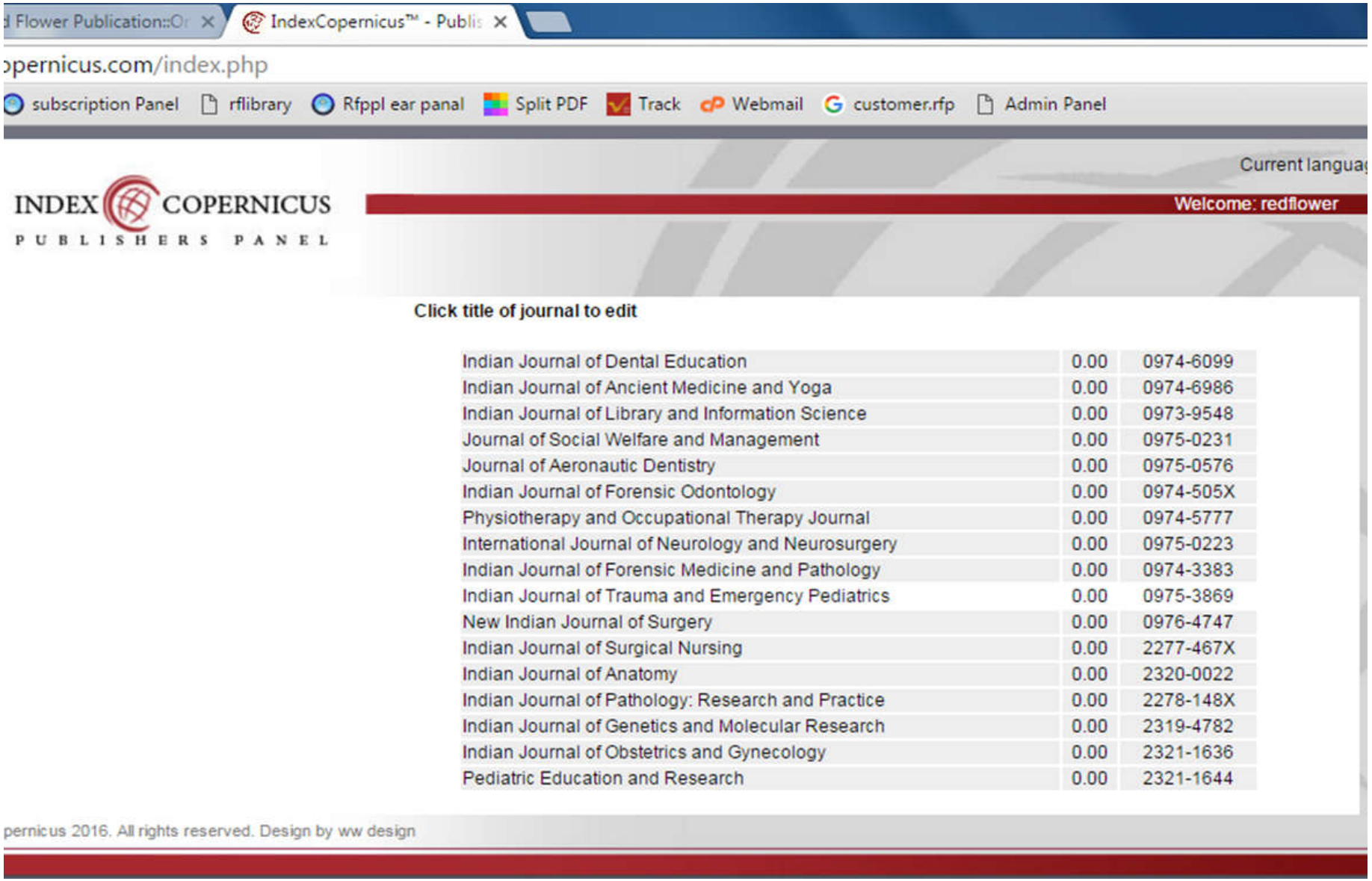

Original Article

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Microanalysis of the Adolescents Suicides

W. Sandhya Manohar*, Gunti Damodar, Nishat Ahmed Sheikh*****

Abstract

Background: Suicide is a significant issue among teenagers. Suicide is now assumed the third leading cause of death among 15 to 44 aged groups in many region of the world and second leading cause of death among 10 to 24 years of age people. Suicide is the leading cause of death for adolescents in the globe and the rates of suicide are increasing fast in teenagers as compared to other age groups. *Study Design:* It's a cross sectional Prospective study. *Material and Method:* The medico legal Post-Mortem Examinations were conducted on the victims of suicides in the age group of thirteen to eighteen years in one year beginning from January to December. Data were collected from the Inquest, Panch-nama of the scene of offence, hospital records, suicide notes and information gathered by personal enquiry with the relatives. *Observation and Discussion:* Total 117 no cases were included in the study, and out this 34.2% were Males and 65.8%were of Females. In females 27 cases came from semi-urban areas, 18 cases belong to rural and 12 from urban areas, whereas in Males 14 cases belong to Rural, 10 cases from urban and only 5 cases from semi-urban areas. 63 cases among females and 34 cases among Males reported to have no history of previous attempt of suicide, whereas 5 cases among females and 2 cases among males have the history of previous unsuccessful attempt of suicide. People with low suicidal intention may end up in completed suicide because of using more lethal methods, inadequate treatment and delay in seeking treatment. This aspect of suicidal behaviour points to lack of clarity in the differentiation of definitions of suicide and attempted suicide. Due emphasis should be given on the intention, lethality and rescuability in killing oneself to differentiate between attempters and completers. *Conclusion:* The prevalence of suicide in India is high and is influenced by a variety of factors, such as, social, biological, psychological and environmental factors. There is a need of thorough research to determine the determinants of suicide among teenagers and adolescents, in order to develop wide-ranging intervention strategies to prevent suicide.

Keywords: Suicide; Adolescents; Determinants; Public Health Issue.

Introduction

A human develops; stops and collapses in several periods from birth until death. These periods are known as childhood, puberty, adolescence, youth, maturity and senility. Each of them includes distinctive and significant psychological and social characteristics. These periods cannot be separated from each other by clear boundaries. The periods of puberty and adolescence among these periods have a special importance because they are the most beautiful, the most powerful and the most hopeful periods of human life [1]. Suicidal deaths are attracting increasingly more attention from medical profession and public health agencies. Suicide is defined by Beck "A willful self inflicted life threatening act, which has resulted in the death." Regardless to any real or suspected trends, suicide is a public health problem by virtue of its present incidence [2].

Suicide is a significant issue among teenagers. Suicide is now assumed the third leading cause of

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death among 15 to 44 aged groups in many region of the world and second leading cause of death among 10 to 24 years of age people [3]. Suicide is the leading cause of death for adolescents in the globe and the rates of suicide are increasing fast in teenagers as compared to other age groups. The suicide attempt rates are higher in females while death rates are higher in males [4]. Worldwide 4 million suicide attempts occur every year, in which at least 90,000 are adolescents up to the age of 19 successfully attempt, at the rate of one successful suicide in every five minutes [5].

Suicidal ideation refers to thoughts of harming or killing oneself. Attempted suicide is a non-fatal, self-inflicted destructive act with explicit or inferred intent to die. Suicide is a fatal self-inflicted destructive act with explicit or inferred intent to die. Suicidality refers to all suicide-related behaviors and thoughts including completing or attempting suicide, suicidal ideation or communications. The present day concept of nuclear and small families causes a lot of changes and pressures on these tender aged persons because of the expectations of their parents. Some of the girls are getting married in this age group, wherein they are expected to live in their in-laws houses, which are unknown and different from their maternal environment. All these factors are playing an important role and abetting them to victimize for suicides. It became second leading cause of death among the adolescents [6,7].

Aim and Objective

In this study we tried to micro-analyze the age related problems faced by the adolescents, which are leading to commit suicide, and to identify the precipitating factors in causation of such medico-legal deaths according to cause of death.

Material and Method

It is a cross-sectional study done in the mortuary associated with Department of Forensic Medicine and Toxicology of Kakatiya Medical College, Warangal. The medico legal Post-Mortem Examinations were conducted on the victims of suicides in the age group of thirteen to eighteen years in one year beginning from January to December. Data were collected from the Inquest, Panch-nama of the scene of offence, hospital records, suicide notes and information gathered by personal enquiry with the relatives. The data was incorporated into a computerised data collection sheet and statistically analysed in the MS office excel spread sheet.

Inclusion Criteria

Cases were included where person died in the age group of thirteen to eighteen years, from both genders, who committed suicide (according to the Panch-nama), cadavers of whom were subjected to Medico legal post-mortem examinations in the mortuary of Kakatiya Medical College, Warangal, including the deaths occurred in hospitals and also unattended deaths.

Exclusion Criteria

Deaths of persons whose age is not certain as, in unidentified bodies, and where a suspicion expressed in the Panch-nama about homicide or accident.

Observation and Discussion

Adolescence is a period of dramatic change from child to adult; the process can be complex and challenging. Total 117 no cases were included in the study, and out this 34.2% were Males and 65.8% were of Females. This is in consistent with the observation of Bhatia [8], where women have outnumbered men in non-fatal unsuccessful attempts. All the cases were distributed according to socioeconomic status, 56 cases were of females in the age group of 16 to 18 years were from low and middle socioeconomic status, whereas 28 cases were from Boys in the age group of 16 to 18 years with low and middle socioeconomic back ground. People of low and middle class, who by virtue of their hand to- mouth existence, fail to nurture their dreams may attempt suicide more often [9].

In the age group of 16 to 18 years 18 females cases were married and 4 cases of males were married, whereas in 13 to 15 years of age group 6 cases of females were found to be married. Married females have outnumbered the unmarried males. This is in contrast with most of the Western studies where highest incidence of suicide was observed among unmarried and lonely individuals [10]. But our findings are consistent with Indian literature [11]. Our study shows that, in Indian set up, different psychological factors related to marital or family life might be operating for suicide.

In the age group of 16 to 18 years in females 27 cases came from semi-urban areas, 18 cases belong to rural and 12 from urban areas, whereas in Males 14 cases belong to Rural, 10 cases from urban and only 5 cases from semi-urban areas. Adoption of western lifestyle, addiction to internet, social networking and poor communal relationships

resulted in more of a mechanical life, psychological distress and therefore increased incidence of suicides in urban and semi-urban population.

In the age group of 16 to 18 years in Females 50 cases of suicide occurred inside the house, only 7 cases were in open field, whereas in the same age group for Males 27 cases occurred inside the house and only 2 cases were reported from open field.

Out of 117 cases of suicide in the study, 63 cases among females and 34 cases among Males reported to have no history of previous attempt of suicide, whereas 5 cases among females and 2 cases among males have the history of previous unsuccessful attempt of suicide. Study from India (Kumar, 2000) [12] shows a negative correlation between suicidal intention and lethality of attempt. That means that even people with low suicidal intention may end up in completed suicide because of using more lethal methods, inadequate treatment and delay in seeking treatment. This aspect of suicidal behaviour points to lack of clarity in the differentiation of definitions of suicide and attempted suicide. Due emphasis should be given on the intention, lethality and rescuability in killing oneself to differentiate between attempters and completers [13].

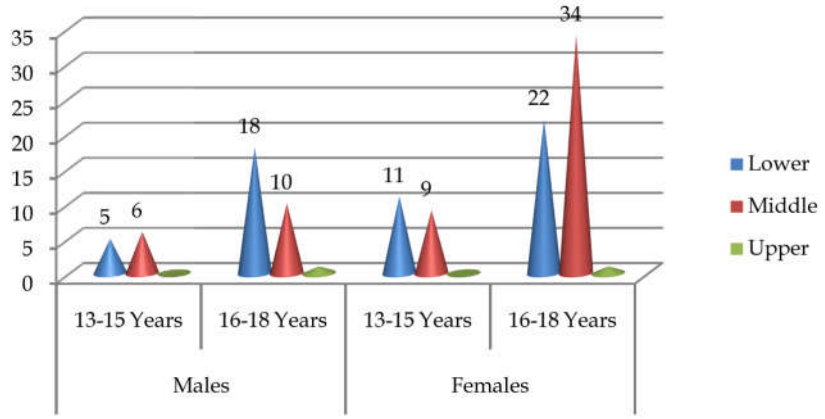

Fig. 1: The distribution of 117 cases according to socioeconomic status

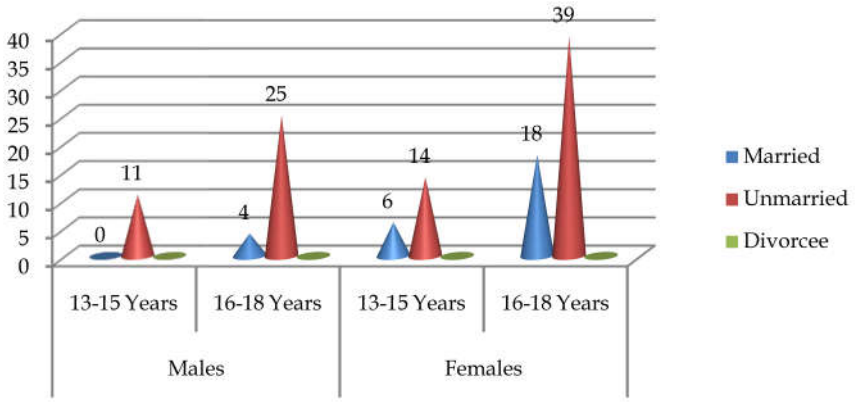

Fig. 2: Distribution of 117 cases according to marital status

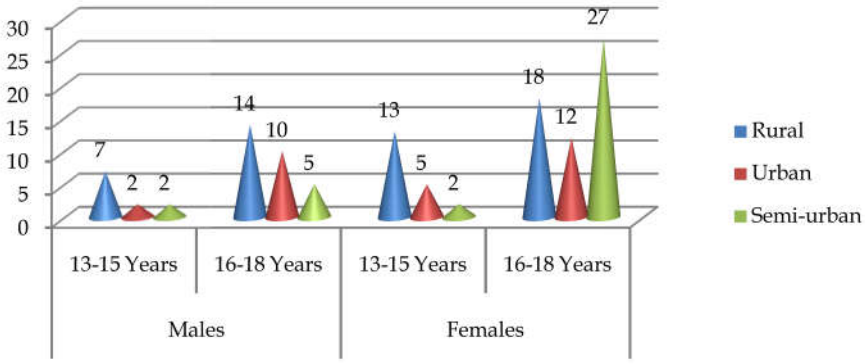

Fig. 3: Distribution of the cases according to rural urban background

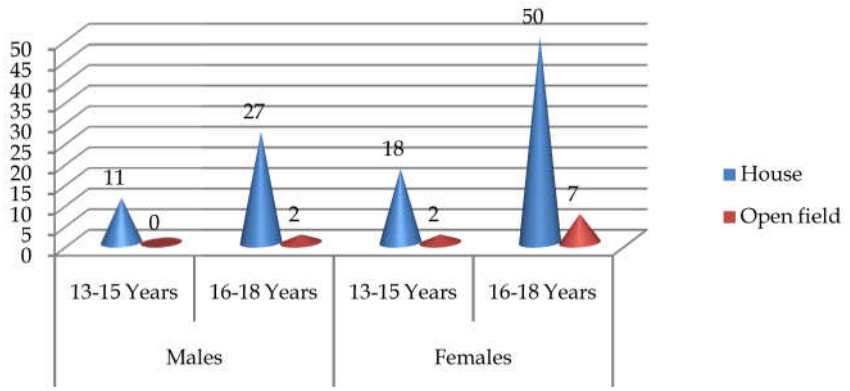

Fig. 4: Distribution of cases according to Place of occurrence of suicide

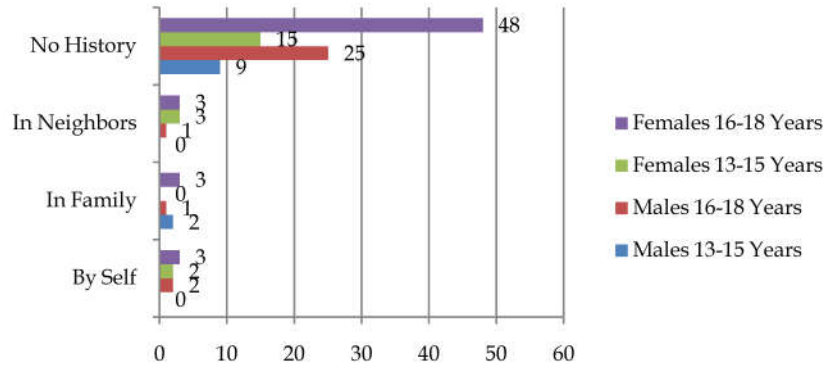

Fig. 5: Distribution of cases according to history of previous attempt of suicide

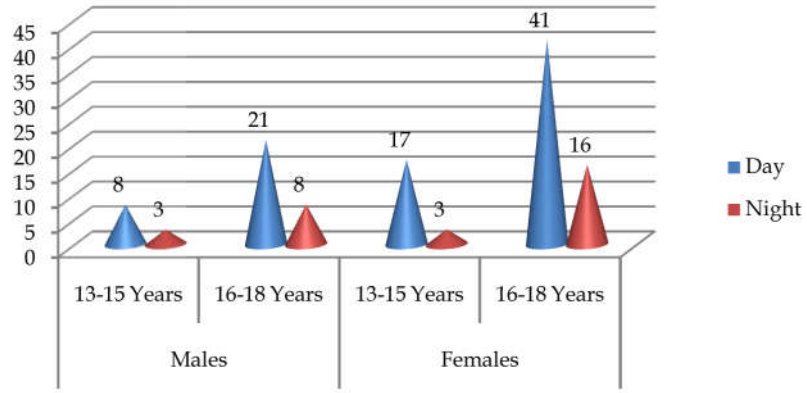

Fig. 6: Time of commencement of suicide

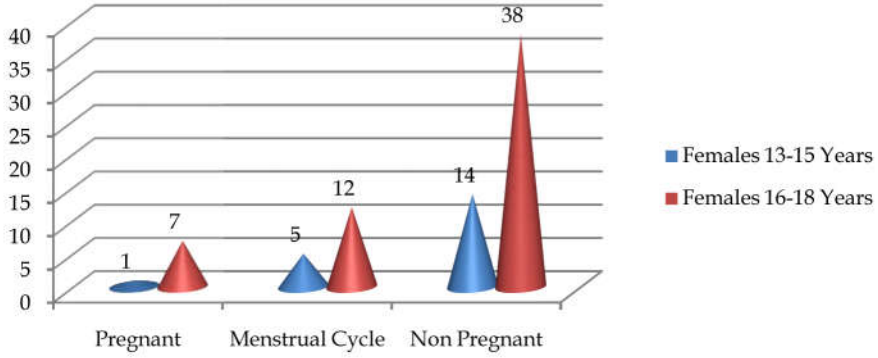

Fig. 7: Distribution of cases according to hormonal status in females

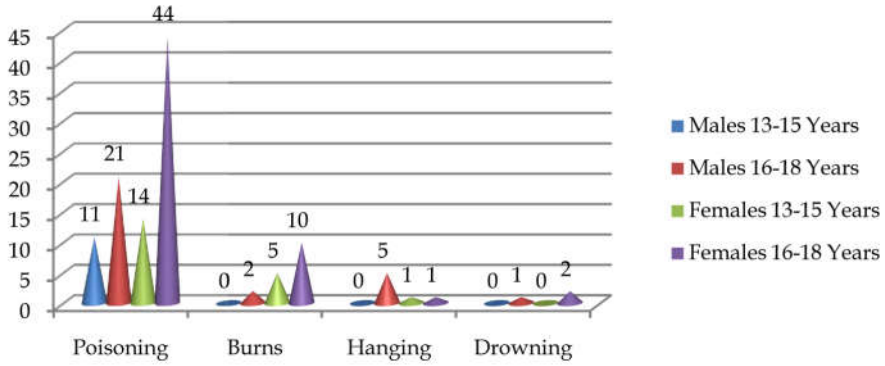

Fig. 8: Distribution of cases according to causes of death

Out of the total cases of suicides amongst adolescents and teenage, maximum number of cases were accomplished during day, 58 cases from females and 29 cases from males were reported to occur during day time whereas 19 cases from females and 11 cases from males occurred during night time. Guardians being busy in their respective occupational works, Lack of supervision of their offspring lead to suicides; majority of suicides took place in their own homes, that too in day time supports this instance. However day time suicides came to notice soon after the incident took place as night time incidents occurred at strange hours i.e., too early in the morning or too late at night which remained unnoticed until following day.

Out of total 117 cases 86 cases belong to females, amongst them the hormonal status was looked for whether they are pregnant, in menstrual cycle or non pregnant, it was found that 17 cases were in phase of menstrual cycle, 8 cases were pregnant whereas 52 cases were non pregnant and non menstruating. Though the physical illness such as dysmenorrhoea or other pains of abdomen were given as motive for committing suicides, it appears to be untrue.

Out of the 117 cases, majority of the cases poisoning was the prominent cause of death, 32 cases from males and 58 cases from females cause of death was poisoning, whereas second most prominent cause of death was burns, 15 cases were among the females and only 2 cases from males, cause of death was burn. Poisoning the most commonly used method for suicide, which is in contrast to the findings observed in England and Wales [14] wherein vehicle exhaust gas has been commonly used and carbon monoxide poisoning was common in Japan [15]. Finding similar to our study have also been observed in India and in other countries by Arun [16], Sachidananda M [17]. Hanging Burns and drowning, this is in accordance with the findings observed by Arun [16] Sachidananda [17]. M,5 Danielle [14,18]. However, in another study, in Kildare, Ireland [16] hanging was the commonest method employed and in South Carolina [15] suicide by gunshot was commonly noted in children under the age of 18 years. Hanging is universally available and it is the most common method of suicide globally. In many places, the ready access to firearms makes them potentially dangerous, especially among male adolescents and young adults.

Conclusion

It is factual that there have been many advances in science to address and prevent suicide. However, the results and effectiveness of preventive measures have not yet achieved the desired results. We believe that despite the progress, knowledge, etc., even in the twenty-first century social and health devices (primary and specialty care, social services, third sector, etc.) it is difficult to coordinate effectively and obtain preventive mechanisms and support for people at high risk. The clinical management of the suicidal teenager requires well-developed clinical skills. In addition to the basic qualities of warmth, curiosity and humor, a good knowledge of the mechanisms through which the decision to attempt suicide is made and how that often recurring pattern can be interrupted, whether with the use of behavioral skills, by improving insight, or with appropriate medication can often bring degree of life saving relief to this common condition.

Media can play a significant role in controlling and preventing of suicide among young people. Awareness can be created in community and nation as a whole by the help of religious scholars and psychologists through seminars and media. The prevalence of suicide in India is high and is influenced by a variety of factors, such as, social, biological, psychological and environmental factors. There is a need of thorough research to determine the determinants of suicide among teenagers and

adolescents, in order to develop wide-ranging intervention strategies to prevent suicide.

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Conflict of Interest

The author declares no conflict of interest in the present study.

Author Disclosures

Authors have no conflict of interest. This study was a part of departmental research activities of Forensic Medicine at Kamineni Institute of Medical Sciences, Narketpally.

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Original Article

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Profile of Firearm Fatalities in Rajkot Region: A Retrospective Study

D.K. Vadgama*, P.J. Manvar, P.R. Varu**, V.J. Aghera**, M.N. Patel***, R.D. Vaghela*****

Abstract

Context: A retrospective study of 40 cases of firearm deaths was conducted in dept. of Forensic Medicine and Toxicology of P. D. U. (Govt.) Medical College, Rajkot during the period of 2000 to 2014. *Aims:* To determine the pattern of deaths caused by firearms in and around Rajkot region. *Methods and Material:* A retrospective study of 40 cases of deaths due to firearm injuries was conducted in Dept. of Forensic Medicine and Toxicology of P. D. U. (Govt.) Medical College, Rajkot during the period of 2000 to 2014. The particulars of the victims, history of the incident, postmortem findings, etc. were recorded from the postmortem reports and relevant documents and are analyzed. *Statistical Analysis Used:* Microsoft excel. *Results:* Incidence of firearms deaths was 0.13% during this period. Most of victims (42.5%) were of age group of 21-30 years. Most of victims(92.5%) were male.82.5% of victims were belonging to lower socio-economical class.67.5% cases were of rifled injuries and 32.5% were of shotgun injuries. Most common targeted part was chest (55%), followed by head and face (45%). 90% cases were homicidal and 10% cases were suicidal. Most of the victims (52.5%) had single firearm entry wound. *Conclusions:* The majorities of the victims were men and age group of 21-30 years. The most common targeted body part was the chest. Most of the deaths were due to rifled firearm injuries and homicidal. In all suicidal cases, the victim were male, females are not using firearm to kill self. Death due to firearm injuries is very less as compared to India and other countries. Incidence of death due to firearm injuries are progressively increasing from 2008, it may be because of modernization in the societies.

Key-words: Firearm Injury; Suicide; Homicide.

Introduction

Guns have the power to turn people into heroes or into villains. The use of firearms has increased due to tech-nological advances in firearms and the ease of obtaining them, legally or illegally.

Violent injuries are the eighth leading cause of death, worldwide [1]. Besides high death toll; firearm injuries cause significant morbidity, long-term physical and psychological disability for individuals, families and societies [2].

The incidences of violent crimes with gunshot injuries have become increasingly more common, reflecting the deterioration of law and order in our society. These are common in the lower and middle income countries [3]. Gun related violence is the most common in poor urban areas and in conjunction with gang violence, often involving juveniles or young adults [4,5].

As compared to other countries of the world, in India violence by firearm is less but illegal country made weapons are rampantly used.

The Objective Of The Study Is To Outline The Pattern Of Firearms Injuries And Deaths In This Area And Compare It With The Pattern Seen In India And Other Countries.

Material and Methods

A retrospective study of 40 cases of deaths due to firearm injuries was conducted in Dept. of Forensic

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Medicine and Toxicology of P. D. U. (Govt.) Medical College, Rajkot during the period of 2000 to 2014 to determine the pattern of deaths caused by firearms in and around Rajkot region. The particulars of the victims, history of the incident, postmortem findings, etc. were recorded from the postmortem reports and relevant documents and are analyzed.

Results

Total 29365 dead bodies were brought to mortuary of P. D. U. (Govt.) Medical College, Rajkot during the study period & only 40 (0.13 %) deaths were due to firearm injuries. Out of total 40 cases, 37 victims were male and 3 victims were female.

22.5% of firearm injuries death were recorded before 2008 and 77.5% of the cases of firearm injuries death after 2008.Incidence of death due to firearm injuries were found to be increased in last 5 years (Graph 1).

42.5% cases were ofthe age group 21 to 30 years, which was followed by the age group 31 to 40 years (25%) and then by 41 to 50 years (17.5%) (Table 1). 50% victims were from rural area and remaining 50% were from urban. 90% cases were homicidal and 10% cases were suicidal and no any case of accidental firearm death. 67.5 % cases were of rifled injuries and 32.5% were of shotgun injuries.

Chest was involved in 55% cases followed by head and neck (45%), neck (35%), upper limb (27.5%), abdomen (20%) and lower limb (12.5%) (Table 2).

Most of the victims have single firearm entry wound (52.5%) followed by more than three entry wounds (27.5%)(Table 3). Most of the victims have no exit wound (47.5%) followed by one exit wound (35%).

When case were analyzed according to range of fire, there were a close shots in 30% cases, near shots in 15% cases and distance shots in 55% cases (Tables 4).

Table 1:

Age group (Y)	Male	Female	Total	%
10-20	3	1	4	10
21-30	16	1	17	42.5
31-40	9	1	10	25
41-50	7	0	7	17.5
51-60	0	0	0	0
>60	2	0	2	5
Total	37	3	40	100

Table 2:

Region Involved	No of Cases	%
Head And Face	18	45
Neck	14	35
Chest	22	55
Abdomen	8	20
Upper Limb	11	27.5
Lower Limb	5	12.5

Table 3:

No of Entry Wound	No of Cases	%
1	21	52.5
2	3	7.5
3	5	12.5
More Than 3	11	27.5
No of Exit Wound	**No of Cases**	**%**
0	19	47.5
1	14	35
2	5	12.5
3	1	2.5
More Than 3	1	2.5

Table 4:

Distance of firing	No. of cases	%
Close (within the effect of burning, blackening, tattooing)	12	30
Near (within effect of blackening and tattooing)	6	15
Distance (outside the effect of tattooing)	22	55
Total	40	100

Discussion

As compared to other parts of India and western countries, the incidence of firearm injuries is less in Rajkot region. Out of 29365 dead bodies were brought to mortuary of P. D. U. (Govt.) Medical College, Rajkot during the study period, only 40 (0.13 %) deaths were due to firearm injuries, which are lower than findings of Nasrullah M et al [7], PradipkumarKhet al [8], Mirza et al [9], Marri MZ et al [10], Sachan R et al [11], Wintemute GJ et al [12].

Out of total 40 cases, 37 victims were male and 3 victims were female. The male preponderance is in agreement with other authors all over the world [7-10]. Use of firearm to kill female is less.

The most of victims(42.5 %)were in the age group between 21 - 30 years. The reason for this could be attributed to the fact that this age is the most active period in an individual's life in terms of their outdoor activity. This incidence of age in the present study is almost in agreement with the findings of Nasrullah M et al [7], PradipkumarKh et al [8], Mirza et al [9], Marri MZ et al [10], Ahluwalia & Gorea [13], Gupta et al [14], Chanana A et al [15], Agnihotri AK et al [16]

and Fatteh et al [17].

In the present series the predominant anatomical site of fatal firearm injury was the chest in 55 % of the cases, followed by head and neck (45%), which is quite high as compared to the findings of Nasrullah M et al [7], PradipkumarKh et al [8], Mirza et al [9], Marri MZ et al [10], Sachan R et al [11], In general the concept of the people is that injury on the chest and head is always fatal. This could be the reason for targeting the chest and head by the assailants in majority of the cases.

67.5 % cases were of rifled injuries and 32.5% were of shotgun injuries. Incidence of death due to firearm injuries in and around Rajkot region were found to be increased since last 5 years. This may be due to easy availability of county made firearms. In India, most of the firearm murder are by unlicensed firearms. As they are generally craft-made and fire single shots; assailants can dispose of them easily and without much loss. They typically cannot be traced to any owner or by ballistic fingerprinting. They are very cheap and are readily available for criminals. Also, obtaining a licensed firearm is difficult. These features make unlicensed firearms ideal for criminal use.

90% cases were homicidal and only 10% cases were suicidal, which is almost in agreement with the findings of Sachan R et al [11]. In all suicidal cases, the victim were male, females are not using firearm to kill self. The site of injuries in suicidal cases was head, face and neck because concept of the people is that injury on these sites is always fatal and easily accessible.

Most of the victims (52.5%) have single firearm entry wound which is almost in agreement with the findings of Sachan R et al [11]. Most of the victims (47.5%) have entry wound only without exit wound, followed by one exit wound (35%).

There were distance shots in 55% cases followed by close shots in 30% cases and near shots in 15% cases, which is in agreement with the findings of Pradipkumar Kh et al [8] (Table 4).

Conclusion

The majorities of the victims were men. The age group of 21-30 years was most affected. The most common targeted body part was the chest. Most of the deaths were due to rifled firearm injuries and homicidal. In all suicidal cases, the victim were male, females are not using firearm to kill self. Death due to firearm injuries is very less as compared to India and other countries. Incidence of death due to firearm injuries are progressively increasing from 2008, it may be because of modernization in the societies.

Whenever weapon of offence is used to produce death, it is always to be a rifled weapon because certainty of producing death and availability is more as compared to shotgun, which is mostly used for the purpose of killing of birds and animals, so criminals does not use shotgun to produce harm on human being.

Our study and other research on firearm injuries prove that certain changes may minimize mortality. There is a need to decrease the number of firearms used and sold in India. We need to eradicate illicit local community gun manufacturing units. It is obvious that private gun ownership should be strictly limited and the illegal availability should be prevented. Elimination of these illegal countries made firearms is of the utmost importance in order to curb the homicidal firearm fatality rate.

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A Study on the Establishment of Poison Control Centre: A Need for the Region of Telangana

T. Krupal Singh*, Lavanya Kowsil G., Jakkam Surendar*****

Abstract

Poison information centers are those, which provide immediate round the clock toxicity assessment and treatment recommendations for the effective management of poisoning cases. Poison control centers also provide referral and management advice for poisoning, information on potential poisons and programs on poison prevention for the general public and health care professionals. Implementation of the poison control center will further enhance the ability of poison centers to improve the care of poisoned patients and reach the overall goal of reducing illness, injury and death due to poisoning.

Toxicological services are essential component of a poison control program. In most of the developing countries, this services are not commonly available in the hospitals. Establishment of analytical toxicological laboratory services, communication between clinicians and toxicologists and availability of antidotes could be helpful in reducing morbidity and mortality in cases of poisoning.

Keywords: Poisoning; Poison Control Centers; Analytical Services; Antidotes.

Introduction

The massive expansion in the availability and use of chemicals, including pharmaceuticals, during the past few decades has led to increasing awareness - on the part not only of the medical profession but also the public and various authorities – of the risks to human health posed by exposure to those chemicals. Moreover, each country has a variety of natural toxins to which its population may be exposed.

Every individual is exposed to toxic chemicals, usually in minute, sub-toxic doses, through environmental and food contamination. In some instances, people may be subjected to massive, or even fatal, exposure through a chemical disaster or in a single accidental or intentional poisoning. Between these two extremes, there exists a wide range of intensity of exposure, which may result in various acute and chronic toxic effects.

Poisoning that involves individual eg. Suicidal, Homicidal , Iatrogenic accidental has certainly the greatest medico-legal significance. Poisoning is a medical emergency and the cases are quickly Rushed to the nearest available hospital. Most of these cases are suicidal or accidental in nature but rarely homicidal. The role of Forensic Toxicology is the detection, identification and measurement for poisons in human biological material [1].

It has been estimated that some form of poison directly or indirectly is responsible for more than 1 million illnesses worldwide annually, and this figure could be just the tip of the iceberg since most cases of poisoning actually go unreported , especially in third world countries. The problem is getting worse with time as newer drugs and chemicals are developed in vast numbers. The commonest agents causing poisoning in India appear to be pesticides (organophosphates, carbamates, chlorinated hydrocarbons, and pyrethroids) , sedative drugs, chemicals (corrosive acids and copper sulphate), alcohol, plant toxins (datura, oleander, strychnos,

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and gastro- intestinal irritants such as castor, croton, calotropis, etc),and household poisons (mostly cleaning agents) [2,3]. Of late aluminium phosphide has begun to emerge as a major player in the toxicological field, particularly in some northern Indian states [4,5]. Acute pesticide poisoning is now an important cause of morbidity and mortality worldwide (Jeyaratnam 1990). In 2006, the World Health Organization (WHO), estimated the global pesticide poisoning at 3 million cases [7] with 220,000 deaths occurring annually about 99% of these deaths occur in developing countries. More recent studies suggests that the number of deaths may actually be around 300,000 [6]. The incidence of poisoning in India is among the highest in the world and it is estimated that more than 50,000 people die every year from toxic exposure [7]. Underreporting and misclassification are extremely common and actual numbers could be much higher. Acute poisoning, a common pediatric emergency is one of the important cause of morbidity and mortality in children specially in developing countries. Among the children the common culprits include kerosene, household chemicals, drugs, agricultural pesticides, industrial chemicals garden plants, bites and stings, miscellaneous products [8,9].The main causes of pediatric poisoning are negligence and ignorance, many deaths and disabling sequelae could very easily be prevented if more attention were given to implementing preventing measures at home.

SNAKE–BITE is an important and serious medico-legal problemin many parts of the world specially in South Asian Countries. It has been estimated that 5 million snake - bite cases occur world wide every year, causing about 100000 [10]deaths. On an average, nearly 200000 persons fall prey to snake - bite per year in India and 35000-50000 of them die every year [11]. But the data on morbidity and mortality of snake-bite are unreliable due to improper reporting system The snakes most commonly associated with human Mortality in India are Cobra (NAJA najanaja), Krait (BungurusCaeruleus), Russels Viper (ViperaRusseli), and Saw Scaled Viper (EchisCarinitus) [12]. Snake-bite cases are observed in almost all age groups , the majority in males aged 21-50 years, while the male to female ratio being 3:1. A study reported an incidence of 7 to 15% in children less than 10 years [13]. So there is a need in the existing knowledge regarding the deleterious effects of toxicants and their preventive or therapeutic measures.

Objectives of the Study

The objectives of poison control center varies widely from patientOriented emergency care to preventive care in the society, 24X7 hours poison information services.

Analytical services – To Provide immediate expert treatment & management advise about household products, pesticides, food poisoning, medicines, plants, bites and stings etc. and Provide training and education sessions to health care professionals, community, and institutions.

Material and Methods

This study was done in 2008 and 2009. The central objective of the study is to elicit the opinion on the need to establish a poison control centre in the region.

Two Main Samples are Selected Namely

- Health care professionals (public and private)
- Health care consumers (general population including students)

The Sample Size in this Study Included

Teaching hospitals – 3, Nursing homes – 24,Other government hospitals – 7,Government and private practitioners – 225,General population including students – 100.

The present study is an explanatory study combining elements of qualitative & quantitative research, which tries to assess the need of establishing a poison control center in the region.

Data was collected by Self- Administered structured questionnaireIndividual interviews. Group discussions in the department. The received data was analyzed according to establish the poison control center in the region.

Results

Reason for Exposure to Poison

Intentional exposure occurred on 683 cases in 2008 and 2009. In this suicidal cases are 532.74(78%), drug abuse cases were 54.64 (8%), misuse cases were 54.64 (8%), unknown cases were 40.98(6%). unintentional cases were 233, in this 43% cases were due to snake bite /scorpion sting, 21% people are effected by poisoning in the agriculture fields,19% due to contaminated food/drink, 9% were due to over use of medicine , 6% due to occupational

exposure, and 2% people suffered by therapeutic drug use.

Total 916 persons suffered with poisoningin 2008 and 2009, in this males were 531.28(58%) and females were 384.72 (42%). 233.64(44%) adult male were suffered with pesticides, 106.2 (20%) were due to unknown poisoning, 95.58 (18%) were due to house hold cleaning substances, 42.48 (8%) due to prescribed drugs, 26.55(5%) due to alcohol and 26.55(5%) due to food poisoning.184.8(48%) adult female were suffered with pesticides, 53.9(14%) were due to unknown poisoning, 69.3(18%) were due to house hold cleaning substances, 23.16%) due to prescribed drugs, 34.65(9%) due to alcohol and 19.25(5%) due to food poisoning.Total 129 children with an average of 4 to 9 years suffered with poisoning in 2008 and 2009.39.99(31%) children were suffered with kerosene, 29.67(23%) were due to drugs/medicine, 28.38 (22%) were due to house hold cleaning substances,14.19(11%) due to pesticides, 9.03(7%) due to cosmotics and 7.74(6%) due to poisonus plants and seeds.The main reason attributed in this age group was their innovative and exploratory nature and mouthing tendencies [14,15].

In years of 2008 and 2009, total 450 cases admitted in the hospital in this 225 case diagnosed by varieus methods, 43% cases were diagnosed by history, 32% by clinical symptoms, 16% by detailed physical examination. 9%by laboratory investigation. And in remaining 225 case faced problem in diagnosis, in 62% case it is due to lack of analytical facilities in the living, in 21% cases it is due to no definite group of symptoms and in 17% case it is due to signs and symptoms some disease mimic the poisoning.

Toatal postmortems conducted in kakatiya medical college Warangal mortuary in 2008 were 1666 in this 509 were due to poisoning. Males were 300.31(59%) and female were 208.68(41%) and in 2009 were 1560 in this 494 were due to poisoning. Males were 281.58(57%) and female were 212.42(43%)

Discussions

The aim of this discussion is to draw valid conclusions from the research findings.

The practice of establishing poison control centers is yet to catch on in a big way in India. On one hand, lack of adequate importance is given to the establishment of clinical toxicological analysis services. On the other hand, there is no clear-cut policy by the government despite the report[26] of UNCED (United Nations Conference On Environment And Development) for establishment of poison centers. Prevention and control of poisoning could be made more effectivethrough a number of appropriate actions by National and local authorities. The main drawback in the current scenario prevailing in the country dealing with poison cases in terms of treatment and prevention is the lack of trained dedicated staff required to treat the cases of poisoning. Hence, the morbidity and mortality from poisoning in the country is one of the highest in the world.

The human resources for a poison control centre consist of medical, paramedical personnel and non-medical staff responsible to perform the duties of the centre on a 24 – hours – a - day, 7 – days – a – week basis.The study has found that in the event of poisoning they rush to the nearest or available medical facility, which in most cases lacks the basics to handle such cases.Both the government and the private sectors are on the same footing. Hence, the high incidence of morbidity and mortality in the region.The financial burden on the families of the victim is much higher as the poisoned person is rushed to the emergency ward / ICU's and exposed to all the paraphernalia of the ICU. Increased poison control centre exposure calls have been associated with reduced emergency department use for unintentional poisoning and appeared to reduce net medical expenditure [16]. Significant data exists that clearly shows that for each dollar invested in the operation of a poison control centre and other poison prevention programs, the return in terms of decreased emergency room visits and other associated health care costs is accentuated many times over.

The above findings strongly favour the establishment of poison control centre in the region.

Conclusion

The present study clearly demonstrated the need to establish a poison control center in the region.

Due to rapid development in science and technology and vast growth in the industrial and the agricultural sector, the poisoning is spreading like wild fire. The management of poisoning cases requires cooperation between analytical toxicology laboratory services and the physicians (clinical toxicology) dealing with the poisoning cases.

As the outcome of the findings in the earlier chapter revealed the cost of management in terms of treatment of a poisoned patient is high, so also the morbidity and mortality. Thus, the service provided by the

Poison information Centre offers considerable direct health benefits by reducing morbidity and mortality from poisoning and enabling the community to make significant savings in health care cost.

In accordance with the WHO's definition of health and its goals, every one should have access to relevant information on how to prevent and deal with poisoning. Poison information centers provide such information and are an essential part of a country's capacity for ensuring the safety of chemical substances. Moreover, the United Nations, through its conference on Environment And Development, has called upon all countries to promote the establishment of poison information centers with related chemical and analytical facilities to ensure prompt and adequate diagnosis and treatment of poisoning, including networks of centers for chemical emergency response.

Organophosphates, used broadly in agriculture, were confirmed as serious risk factors in the study conducted by WHO. Illiteracy, social proxy, poverty and malnutrition, aggravated the risk of being poisoned. Andhra Pradesh, and specially Warangal district were a part of this assessment was carried out, have some of the largest reported use of organ of phosphates and the highest reported rates of pesticide poisoning in India [17].

Newspapers, radio (FM) and televisions are valuable since the media have a key role in bringing information to the public. The publishing or broadcasting of educational messages on the prevention of poisoning can form part of a general process of health education and also educating the masses (schools, colleges, and general public) through seminars about the prevention and first aid of common poisons.

Recommendations

Establishing properly equipped and staffed poison control centers would constitute a major step in ameliorating the situation.

Proposed Solution

The data obtained in this study and the retrospective study data strongly recommend the Establishment of Poison Control Centre in the region. The objectives of the poison control centre would vary widely from *patientoriented emergency care to preventive care* in the society.Implementation of the Poison Control Centre Enhancement and Awareness Law will further the ability of poison centers to improve the care of poisoned patients and reach the overall goal of reducing illness, injury and death due to poisoning.

A typical regional poison centre should ideally be located within or closely associated with a hospital. Location within a hospital has the advantage of providing ready access to a network of medical disciplines that will support and enhance the work of the centre. A regional poison centre serves the population of approximately 4 million people, and handles about 35000 human exposure cases every year.

The Poison Centre Should Utilize the Software Package

TOXINZ from new Zealand which has information on thousands ofpoisonous substances encountered worldwide.

Access to INTOX and CHEMINFO of the WHO.

These packages enable the centre to answer any query on poisons or poisonings in a matter of seconds via email or phone or fax. Both health care providers and public can contact the poison control centre for any queries (free of charge) relating to poisons, poisoning (acute or chronic) drug overdose, drug adverse effects, drug abuse and food poisoning.The poison centre should function round the clock i.e. 24x7 hours, 7 days a week, 365 days a year. The poison centreprovides the following services. the poison control centre should have contact with other poison centers, both nationally and internationally. This helps in exchange of case data and kniwledge. A poison information centre needs a multi-disciplinty team. The team may include physicians,psychiatrist, nurses, analysts, pharmacists and others.specific areas should be there t keep all basic and advanced instuments like UV and Visible spectroscopy, Fourier transform infrared spectroscope (FTIR), High Performance Thin Layer Chromatography (HPTLC), Gas Liquid Chromatography (GLC),High Performance Liquid Chromatography (HPLC) Gas Chromatography – Mass Spectroscopy (GC –MS), Liquid Chromatography – Mass Spectroscopy (LC-MS), Flame Ionization Atomic Absorption Spectrometry, Inductive Coupled Plasma Source Spectrometry The regional poison centre should also take the responsibility of education in the following way. Books, journals, and other published literature are indispensable for the work of a poison information centre. Poison information centers should be officially recognized by government authorities. They should have independent status, stability and neutrality to enable them to carry out their functions effectively. The legal status of a centre

should enable it to maintain confidentiality of the data it handles.The main source of financial support is a government responsibility.Other sources of funding may be acceptable if they are available and if the autonomy of the centre is guaranteed.

Having such facilities available at least on a regional level that can be shared by several hospitals of that region could go a long way in bringing down the high mortality in poison cases by better access to latest information on diagnosis and management.

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Study of Injuries Due to Road Traffic Accidents Autopsies conducted at Kirodimal Govt. Hospital, Raigarh

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Abstract

Aims and Objectives: The present study was carried out as a pilot study to know the involvements of vehicle and epidemiological aspects of road traffic accidents in Raigarh district. *Material and Method:* All the cases of road traffic accident brought to the department of forensic medicine & toxicology, *Kirodimal Govt. Hospital, Raigarh* for medico legal post-mortem examination during the period from 18th March 2015 to 17th October 2015 were the subjects of the study. Information regarding place of incident, age, sex, mode of travel by victims, and types of injuries responsible to cause of death was gathered from detailed history taken from the relatives of deceased and from the Police inquest. *Results:* Total 273 post-mortem had been conducted, out of which 50 cases were road traffic accidents. The maximum victims were male (Male: female ratio 9:1) and were in age group of 21-50 years. Among the presence of injuries head injuries were present in maximum number of victims 27(54%) followed by the chest and abdominal injuries 06(12%) victims. The maximum number of victims those were travelling by two wheeler vehicle (44%) followed by the pedestrians (30%).

Keywords: Road Traffic Injuries; Two Wheeler Victims; Head Injury; Vehicular Accident and Pedestrians.

Introduction

American safety council defined accident in the following way-"Occurrence in a sequence of events which usually produces unintended injury, death or property damage"[1]. A study conducted in Nagpur under assistance of WHO, coined accident as "Unpremeditated event resulting in recognizable damage"[2]. Oxford dictionary defined "An unfortunate incident that happens unexpectedly and unintentionally, typically resulting in damage or injury"[3]. Therefore after considering the above mentioned definitions to prove accident necessary ingredients should be-

1. Happening of an incident.
2. Without any motive or intention.
3. Due to the incident unintended injury or death or damage occurs.

According to Panda etal [4] "Road traffic accident can be defined as accident involving any type of road user may it be a person walking, standing, running, riding, driving, travelling or walking on the road where either of any motorized or non motorized vehicle is involved"

ohan D etal (2002) [5] defined R.T.A. (Road Traffic Accident) in the following manner- "Any person killed immediately or dying within 30 days as a result of an injury or accident".

As per WHO report [6] that the Road Traffic Accident are 6th leading cause of death in our country with a greater share in hospitalization, death, disabilities along with socio economic losses in young and middle age populations. According to Madan (2006) [7] pointed out –Each year road traffic injuries take the lives of 1.2 million men, women and children around the world and seriously injure millions more.

With the advent of economicand industrial revolution life has become very fast and accidents are one of the tragic events causing enormous loss of

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human lives and disabilities. According to WHO, Road Traffic Accident is one of the leading causes of morbidity and mortality which surpasses the other causes of deaths like cardiovascular and cancers. In India, for individuals for more than 4 years of age more life- years are lost due to road traffic accidents than due to cardio vascular diseases or cancers [1]. It causes not only deaths and disabilities but also affects economic status of the family and also loss of GDP.

In India road traffic accidents is one of the five leading cause of death [2]. In every six minutes one succumbed and ten are injured on Indian roads [3]. It is estimated by the year 2015 , number of deaths would be 1,54,600, and number of serious injuries would be 30,92,000 and number of minor injuries would be 1,08,22,000 [4]. Majority of accidents are preventable [5]. By 2020, deaths and disabilities resulting from road traffic accidents in comparison to other diseases will rise from current 9th position to 3rd position and the developing nations will account for 90% of world's traffic fatalities[6]. Overcrowding and lack of awareness, poor implementations of safety precautions and increase in the number of vehicles have resulted in an increasing number of accidents [7]. The people of the age of 3rd decade were most commonly involved in RTAs [8]. In developed countries, they are the most common cause of death below the age of 50 years, and in young people this trend is more marked [9]. In developed countries, the rate of injury and deaths amongst motorcyclists is far higher than among car drivers [10].

Materials & Method

This prospective study was conducted as a pilot study in the Dept. of Forensic Medicine & Toxicology of Late ShriLakhiramAgrawal Memorial Govt. Medical College, Raigarh, during the period from 18th March 2015 to 17th October 2015. The medico-legal autopsy work was entrusted to the Dept. of Forensic Medicine of this college w.e.f 18.03.2015. All the cases ofroad traffic accident (R.T.A) brought to the mortuary of this college for medico legal post-mortem examination were the subjects of the study.A proforma was designed to collect the detailed information regarding place of incident, age, sex, mode of travel by victims, and types of injuries responsible to cause of death. This informationwas gathered from documentavailable with Emergency department, Inquest report, postmortem findings and relatives deceased and the Police.

Result

Basic Information about Raigarh District

Raigarh is a district of Chhattisgarh state well known for coal reserve, power generation, Iron ore and Steel productions. Whose area is 6528 KM [2] (aprox.) and population is 14, 93,984 according to 2011 census with population growth rate 18.05% with average literacy rate 72.3%.

Data Analysis

A total 273 cases received for postmortem examination at our department during the period of study, and out of which 50 (18.32%) cases were due to road traffic accident.

Among the total no. of 50 (fifty) cases examined, the following aspects of information were analysed and presented in the result –

1. Police station wise distribution of case
2. Sex wise distribution
3. Age wise distribution
4. Mode of travel by victims
5. Injuries responsible for cause of death
6. Time gap between accident and death

Since Kirodimal Govt. Hospital is the main centre for treatment in Raigarh district and it is within the jurisdiction of City Kotwali P.S., therefore maximum cases of R.T.A. is admitted in this hospital, Kotra Road P.S. is situated within near vicinity of State High Way, more over Jute Mill, Chakradhar Nagar, BhupdeoPur, Lalunga and Pussor P.S. are under the jurisdiction of Late Shree LakhiramAgrawal Memorial Medical College and Kirodimal Govt. Hospital for medicolegal autopsy.

Table 1: Police station wise distribution

Name of P.S	No. of Victims	Percentage
City Kotwali	33	66%
Kotra Road	09	18%
Jute Mill	06	12%
Chakradhar Nagar	02	04%
BhupdeoPur	01	02%
Lalunga	01	02%
Pussor	01	02%

Table 2: Sex wise distribution

Sl. No	Sex	Number of deceased	Percentage
1	Male	44	88%
2	Female	06	12%

Table 3: Age wise distribution

Age group	No. of deceased	Percentage
0-10	01	2%
11-20	05	10%
21-30	13	26%
31-40	12	24%
41-50	10	20%
51-60	08	16%
61- Above	01	02%

Table 4: Mode of travel by the victims

Mode of Travelling	Number	Percentage
Two wheeler driver	22	44%
Pedestrian	15	30%
Identity unknown	06	12%
Cyclists	02	04%
Pillion rider of two wheelers	02	04%
Four wheelers driver	02	04%
Trailer drivers	01	02%

Table 5: Time gap between accident and death

Time gap between accident and death	Number of death	%
Brought dead	2	04%
0-6 hrs	26	52%
6-12 hrs	7	14%
12-24 hrs	7	14%
More than 24 hrs	8	16%

Table 6: Injury responsible for cause of death

Injury Responsible for Cause of Death	Number	Percentage
Head injury	27	54%
Multiple injury (Head + Chest+ Abdomen + Limbs etc)	05	10%
Chest and Abdominal injury	06	12%
Thorax or Chest	05	10%
Lower limb injury	04	08%
Head and Chest injury	02	04%
Abdominal Injury	01	02%

Age Wise Distribution of the Cases

It wasfound that maximum number of victims were between 21-50 years of age (70%)and minimum number of cases were from the age group of 0-10 years (2%) and above 60 years (2%) (Table-2).

About 70% of victims of RTA were drivers and only 30 % were pedestrians. Among the drivers of different types of vehicles, there were majority of two wheeler drivers (44%) (Table-4).

From above table we tried to conclude the critical period after the RTA so that medical facilities can be provide to the injured person as early as possible and lives can be saved. The maximum number of deaths was within 6 hours so if the medical facilities areprovide within 6 hours the life of majority victims can be saved.

Discussion

The present study was taken as a pilot study to know the pattern of injuries in cases of road traffic accidents in this area. On the basis of findings of this study a detailed study will be planned and carried in future. The findings of this present study showed that most of the cases were referred from City Kotwali police station because tertiary level health facilities are available at Kirodimal Government Hospital which is situated within its jurisdiction and most of the serious cases from Raigarh district referred to this Hospital for treatment.

Most of the victims were male (44 males out of 50 victims) as we found in our study and the same thing was also found in the study of Raoetal (2010) [15]. Because in Indian context malepeople are earning person of the family and they are more movable than female hence they are more prone to accidents.

Considering of the age factor of the deceased maximum number was belongs to (21-30) age group (13 out of 50) followed by the age group of (31-40)and less vulnerable deceased belongs to (61-Above) age group. The same trend was also observed in the study of Raoetal (2010) [15], Gunjan et al (2005) [16], Wong T W et al (1989) [17] and Sathiyasekaran (1991) [18]. As a result there is a barrier for family growth, Regional growth and decreased in G.D.P as because such group is the potential earning group.

Motor cyclists or two wheeler drivers are prone to death as maximum numbers (44%) of deceased were two wheeler drivers. Similar information was also exampled in the study of Raoetal (2010) [15], Wang T.W etal (1989) [17], Sathiyasekaran (1991) [18], Dhingraetal (1991) [19], Ghosh P.K. (1992)[8], Frank T.M. (1993) [20]. Second most common among the people of pedestrian constituting 30% of the deceased.

Most of the motorcyclist had received country coup injury as the surface is fixed and head is moving. As a result maximum death was occurred due to head

injury (27 out of 50 cases)as found in our study same information was found in the study of Rao et al (2010) [15]. Second most common cause of death was Chest and abdominal injury (12%) however it is very far less than head injury. After motor cyclists pedestrian constitutes second highest number of victims (30%) which is contrast to study of Jha et al (2003) [21]. This can be explained by that middle class earning people commonly use of motorcycles as their way of transportation.

No information relating to use of helmet in case of two wheeler drivers mentioned in inquest report so the helmet factor was not possible to analyze regarding head injury in our study.

Conclusion

In our study head injury was found as common cause of death among two wheeler rider and pillion rider, therefore it is advisable that the two wheeler driver and pillion rider should use properly designed helmets the same should be made compulsory among two wheeler riders.

rompt services relating to sending the victim is necessary along with establishment of trauma centre. Public awareness relating to causative factors for Road Traffic Accidents should be developed with involvement of different N.G.O's. Different safety parameters should be checked regularly by competent authority.

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Original Article

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Evaluation of Unnatural Death of Newly Married Women in Rajkot Region

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Abstract

Context: The unnatural deaths of newly married women, at present, is a burning problem of the society, increasing day by day. This has thrown a major challenge to the police personnel, medico-legal experts as well as to judicial officers not only to wipe out this social menace but also to penalize the culprits in deterrent manner. This study focuses to learn socio-epidemiological profile of unnatural death of newly married women in Rajkot region. *Aims:* To evaluate unnatural deaths of newly married women in Rajkot region. *Method and Materials:* The present study was conducted on 153 cases of newly married female victims of unnatural death cases during year 2013 at Department of Forensic Medicine, P.D.U. Govt. Medical College & Hospital,Rajkot. All required information was collected by inquiring investigation officers and relatives of deceased and from postmortem findings. *Conclusion:* Commonest reason for unnatural death of newly married women is dowry related harassment. Lower education in bride, lower income of husband and maladjustment of bride in new family are reasons for higher incidence of unnatural newly married female deaths. If responsible authorities focus on these factors while designing policy to deal with crime against women, incidences of unnatural death of newly married women will decrease.

Keywords: Unnatural Female Death; Newly Married Women; Burns; Crimes against Women.

Introduction

The unnatural deaths of newly married women, at present, is a burning problem of the society. It is increasing day by day owing to prevailing socio-economic fabric and life style in the family. It is hitting the headlines of every newspaper every day. Hardly a day passed when the newspapers do not report the occurrence of this tragic event. This has thrown a major challenge to the police personnel, medico-legal experts as well as to judicial officers not only to wipe out this social menace but also to penalize the culprits in deterrent manner.

In past 50 years, many revolutionary laws are made by law makers for the safety and well-being of women in society. Dowry Prohibition Act was enacted in 1961, while IPC section 304B (Dowry deaths) and 498A (Cruelty by husband or in laws) was incorporated in the year 1980. In 1985, home ministry of Gujarat issued circular in case of suspicious death of young married women under instruction of central government, as per which inquiry in such cases should be conducted by police officer not below rank of Deputy Superintendent of Police, and postmortem should be conducted by panel of two doctors [1]. Even after enactment of such rules, crime against women is on rise as ever. As per National Crime Records Bureau, crimes against women have continuously increased during 2010-2014 with 2,13,585 cases reported in 2010, which increased to 2,28,649 cases in 2011, which further increased to 2,44,270 cases 2012 and 3,09,546 cases in 2013. In 2014, a total of 3,37,922 such cases were reported [2].

Reasons for such rise could be many. The condition of uneducated and non-working class of women is pathetic in many sections of society. They suffer from low self-esteem and are soft targets for domestic violence. Other reasons are dependency of

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women on their family for money, cumbersome judicial system and attitude of police towards women.

In present study, we have tried to analyze various factors responsible for increasing cases of unnatural deaths of newly married woman in society. Results of this study can be useful for concerned authority to formulate stronger steps to decrease crime against women.

Materials and Methods

The present study was conducted on the newly married female victims of unnatural death cases during the year 2013 at Department of Forensic Medicine, P.D.U. Govt. Medical College & Hospital,Rajkot. Out of 2503 autopsies conducted during that year, 153 cases with following criteria were included for the study.

1. All the cases of married women who had died within 7 years of married life whose cases were registered under section 302, 304 (B), 306 or 498 (A) of IPC.
2. All the cases of unnatural death of married women who had died within 7 years of married life whose inquest was conducted by magistrate or police under CrPC 174 or 176, but cases were not registered under any section of IPC at that time.

Cases of death of women due to natural causes andunknown dead bodieswere not included in the study.

The information regarding the cases was obtained (1) from investigating officers and police papers, (2) from dying declaration and suicide notes if available, (3) by interviewing the parties of both sides (Parents & In-laws) regarding age, education, socio-economic status, duration of married life etc. (4) post mortem examination findings, (5) chemical examination reports.

The data so collected were entered in proforma, compiled and tabulated in master-chart and wereanalyzed statistically using Microsoft Excel and conclusion were drawn after comparing and discussing with similar type of work carried out by other authors.

Results

We have studiedtotal 153 cases of unnatural death of newly married women with minimum age of 18 years and maximum age of 34 years. Maximum cases of unnatural death were found in age group of 23 to 26 years (39.87%), while only two cases were found in age more than or equal to 31 years (1.31%) [Table1].

Maximum cases of unnatural newly married women death were found within first year of married life (22.88%), followed by within 4 to 5 years of married life (18.30%) and least cases were found within 6 to 7 years of married life (6.54%) [Table 2].

Maximum cases of unnatural newly married women death were found where deceased's educational status was up to primary school (32.03%), and least cases were found where deceased were studied up to higher secondary school(11.76%) [Table 3].

Maximum cases of unnatural newly married women death were found where occupation of deceased's husband was labour (45.10%), followed by business (31.72%), and least cases were found where deceased's husband was government or private employee (5.88%)[Table 4].

Maximum number of cases of unnatural newly married women death were found in lower middle socio-economic status (43.79%), followed by upper middle socio-economic status (26.14%) and least commonly found in middle socio-economic status (6.23%) [Table 5].

Commonest cause of death in cases of unnatural newly married women death wasburns (50.33%), followed by poisoning (23.53%) and least commonly found cause of death was drowning (0.65%)[Table 6].

Commonest manner of death in cases of unnatural newly married women death was suicide (58.17%) and least commonly found manner of death was homicide (3.92%) [Table 7].

Table 1: Distribution of cases according to age

Age Group (years)	No. of Cases
18 – 20	28 (18.30%)
21 – 22	30 (19.61%)
23 – 24	21 (13.73%)
25 – 26	40 (26.14%)
27 – 28	19(12.42%)
29 – 30	13 (8.50%)
=31	2 (1.31%)
Total	153 (100%)

Table 2: Distribution of cases according to duration of marriage

Duration of Marriage (Years)	No. of Cases
≤1	35 (22.88%)
>1 to ≤2	21 (13.73%)
>2 to ≤3	24 (15.69%)
>3 to ≤4	14 (9.15%)
>4 to ≤5	28 (18.30%)
>5 to ≤6	21 (13.73%)
>6 to ≤7	10 (6.54%)
Total	153 (100%)

Table 3: Distribution of cases according to educational status of deceased

Educational status	No. of Cases
Illiterate	24 (15.69%)
Primary	49 (32.03%)
High school	32 (20.92%)
Higher secondary school	18 (11.76%)
Graduate	30 (19.61%)
Post Graduate	0 (0%)
Total	153 (100%)

Table 4: Distribution of cases according to occupation of husband

Occupation of Husband	No. of Cases
Farmer	28 (18.30%)
Labourer	69 (45.10%)
Govt. or Private Employee	9 (5.88%)
Business	47 (30.72%)
Unemployed	0 (0%)
Total	153 (100%)

Table 5: Distribution of cases according to socioeconomic status

Socioeconomic status	No. of Cases
Higher	14 (9.15%)
Upper Middle	40 (26.14%)
Middle	8 (5.23%)
Lower Middle	67 (43.79%)
Lower	24 (15.69%)
Total	153 (100%)

Table 6: Distribution of cases according to cause of death

Cause of Death	No. of Cases
Burns	77 (50.33%)
Poisoning	36 (23.53%)
Hanging	24 (15.69%)
Drowning	1 (0.65%)
Head Injury	10 (6.54%)
Other	5 (3.27%)
Total	153 (100%)

Table 7: Distribution of cases according to manner of death

Manner of Death	No. of Cases
Suicide	89 (58.17%)
Homicide	6 (3.92%)
Accidental	58 (37.91%)
Total	153 (100%)

Discussion

In last 60 post-independence years, India has progressed tremendously in all fields of development of society, but we have not succeeded to curtail crime against woman, particularly crime against newly married woman. Shaken by such magnitude of unnatural death of newly married woman, bench of Justices Markandey Katju and Gyan Sudha Mishrasaid in one such judgment that "The hallmark of a healthy society is the respect it shows to women.Indian society has become a sick society. This is evident from the large number of cases coming up in this court and also in almost all courts in the country in which young women are being killed by their husbands or by their in-laws by pouring kerosene on them and setting them on fire or by hanging/strangulating them." In the present study,we have studied factors responsible for higher incidence of unnatural death of newly married woman, results of which can be useful for concerned authority to formulate stronger steps to decrease such incidences.

In present study, out of total 165 women, who had died within 7 years of married life, whose autopsy were performed at our institute in the year 2013, 153 (92.72%) were victims of unnatural death. This shows that incidence of unnatural death in newly married female is really higher.

Most victims of unnatural deathin present study were ageing between 23 to 26 years (61.07%), while only two victims were ageing more than or equal to 31 years (1.31%), similar results were found by Singh J et al. [3] (35.85% cases in age group of 22 to 25 years) and Arora P et al. (31.47% cases in age group of 23 to 26 years).

Most victims of unnatural death in present study died within first three years of married life (52.30%), and least victims died within 6 to 7 years of married life (6.54%). Similar findings were observed by Singh J et al. [3], Shakya NK et al [4], Verma RK et al. [5] and Arora P et al. [6] (72.64%, 50%, 57.46% and 60.14% respectively within first three years of life). Reason for such findings is that usually demands of dowry by in laws is more during initial years of marriage, while during later years of marriage, as brides become settled with in-laws family and as they have children, in-laws stop demands of dowry to save their family. Moreover, during later period of marriage, most women have children, so they do not commit suicide thinking about future of their children. Another reason for such findings is that women commit suicide during initial marital period due to mal adjustment in new environment.

Most of the victims of unnatural death in present study were studied up to primary school (32.03%). In least number of cases, victim were highly educated (11.76%-up to higher-secondary school and 19.61%-graduate). Similar findings were observed by Shakya NK et al [4](37%-up to primary school, 20.1%-up to higher-secondary school and 7.8%-graduate) and Arora P et al. [6] (37.76%-up to primary school, 4.20%-up to higher-secondary school and 2.80%-graduate).Verma RK et al. [5] found higher incidence of unnatural death in illiterates (35.75%). Reasons for such findings are awareness of well educated women about rights of women and women friendly dowry related laws, moreover they are economically independent, so, they choose dissolution of marriage instead of committing suicideif they are unhappy with their married life.

Husbands of most victims of unnatural death in the present study were labourers (45.10%) or farmers (18.30%), while in least number of cases, husbands were private or government employee (5.88%). Similarly, most victims were belonging to lower middle socio-economic class (43.79%), while less number of victims were from middle (5.23%) or higher socio-economic class (9.15%). Similar findings were observed by Arora P et al. [6] (55.25% in lower middle and 2.80% in upper middle socio-economic class). Verma RK et al. [5] found higher incidence of unnatural death in lower (37.10%) and lower middle socio-economic class (34.29%). Reason for such findings is monetary needs of economically poor in-laws. They harass brides to get dowry to fulfill their need, and to end their sufferings, brides commit suicide.

Commonest cause of death in victims of unnatural death in the present study was burns (50.33%), followed by poisoning (23.53%). Similar findings were observed by Verma RK et al. [5] (39.82% burns, followed by poisoning 19%). Burns was commonest cause of death in the study of Shakya NK et al [4],Verma RK et al. [5] and Arora P et al. [6]. Incidence of burns in unnatural death is higher due to the fact that in-laws usually choose burns to kill bride so they can save themselves by stating incidence as an accident in front of judiciary. Commonest manner of death in victims of unnatural death in the present study was suicide (58.17%), followed by accidental (37.91%) and least commonly found manner of death was homicide (3.92%). Similar findings were observed by Verma RK et al. [5] and Shakya NK et al [4]. Reason for such higher incidence of suicide in newly married women could be mal-adjustment in new family as well as cruelty and harassment by in lows, as they choose suicide to end their mental and physical suffering. The reason for higher incidence of accidental deaths in in newly married women could bedue to increase events of kitchen accidents, however, such higher incidence of accidental deaths could be false as it is difficult to discriminate between suicidal, homicidal and accidental burns, so some suicidal or homicidal burns cases might have ended as accidental cases in police inquiry.

Conclusion

From the present study, it is evident that despite of efforts by government to stop dowry deaths, dowry related harassments are still commonest reason for unnatural death of newly married women in most parts of India. Lower education in bride, lower income of husband and maladjustment of bride in new family are reasons for higher incidence of unnatural newly married female deaths. If responsible authorities focus on these factors while designing policy to deal with crime against women, incidences of unnatural death of newly married women will certainly decrease.

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Review Article

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Radiology as a Tool in Forensic Practice

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Abstract

The present paper highlights the importance of radiology in forensic practice, which is applicable to the living as well as the dead. The interaction between the two disciplines is considerable, as forensic problems ranging from personal identification to age estimation have been solved radiologically. Through the years, radiology has proved to be an invaluable tool in the investigation of violent and unnatural deaths. A recent development in this field is the concept of a 'virtual' or 'digital' autopsy that seeks to replace the scalpel with a scanner to determine the cause of death. Modern imaging techniques may be more acceptable to society than conventional postmortem examination-viewed by laymen as mutilating and disfiguring.

Keywords: Forensic; Radiology; Virtual Autopsy.

Introduction

Forensic radiology uses medical imaging to answer a variety of legal questions, including those about suspicious and violent deaths [1]. In developed countries of the world, radiology is being increasingly employed as a tool in the investigation of medicolegal cases[2]. However, in our local set up, it is used only for special purposes.

The field of radiology comes in contact with the law whenever radiological methods assist in solving a forensic problem. One of the main areas where it is applied clinically is in age estimation of individuals, and almost every Forensic Department in the country has an age clinic attached to it.

In the years since Wilhelm Roentgen's discovery of x-rays, the use of radiography and other medical imaging specialities to aid in investigating civil and criminal matters has increased as radiologic technology can yield information that otherwise is unavailable [3].

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The present paper gives an overview of the various applications of radiological techniques, such as radiographs, Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) in different medico-legal situations, in both the living and the dead.

Clinical (in the Living)

In the examination of clinical forensic cases, usually in the Emergency or Forensic Department of the hospital, plain x-rays provide information for formulating an opinion regarding simple or grievous injuries in doubtful situations. They also help in age estimation of individuals in civil and criminal cases. The application of imaging procedures in living patients are enumerated in detail below:-

Cases of Trauma with Medico-Legal Implications

Routine Trauma Cases in Casualty

During the medical examination of cases of road traffic accident, fall from height or physical assault, which could lead to legal proceedings at a later date, x-rays aid in determining location, extent and nature of skeletal injuries, and in dating of fractures for medicolegal purposes. While preparing the wound certificate, casualty medical officers often rely on x-rays for diagnosing closed fractures, in order to give an opinion as to whether an injury is simple or

grievous in nature. According to Section 320 of the Indian Penal Code, fracture of a bone or tooth amounts to grievous injury, for which punishment of the offender is prescribed under Sections 325 and 326 of the Indian Penal Code [4].

Magnetic Resonance Imaging (MRI) has been found to be well suited to the examination of surviving victims of assault, and helps visualise internal injuries not seen at external examination of the victim [5].

Cases of Suspected Child Abuse

In our centre, such cases are few and far between. However, with moral degeneration in society and prevalence of social evils, they are on the rise, as is evident from the cases reported to the district child welfare committee (CWC). A child who has been physically abused may be brought to the hospital by the caretaker (abuser) with an inaccurate history that is inconsistent with the clinical findings. For instance, a 7 year old girl may present with alleged history of fall from height two hours ago, whereas the clinical examination reveals several fresh as well as healed injuries. Further, x-ray of the chest shows multiple rib fractures in various stages of healing. Thus, radiographs aid in recognition of rib and long bone fractures which may be clinically silent in children. According to Brogdon, oblique diaphyseal long bone fractures are highly suggestive of abuse, particularly in infants [6]. These fractures apparently result from twisting and torsion forces which cannot be generated from simple falls and accidents. Hence, the pattern and age of injuries along with findings that do not tally with the history should raise the suspicion of the medical officer to the possibility of child abuse.

Age Estimation

This is one of the most commonly performed examinations in forensic practice. Dental radiographs clearly demonstrate the development of teeth, eruption status and degree of root completion, which may be useful when tooth eruption is not visualised on inspection of the oral cavity. The appearance and fusion of ossification centres, in different parts of the body, may be observed on a good X-ray film, using antero-posterior and lateral views. The usual x-rays taken for this purpose are those of the wrist joint, elbow joint, shoulder joint, knee joint and pelvis. These serve as a very useful tool for the forensic specialist when giving an opinion regarding the age of an individual in potential sports competitors, alleged juvenile offenders and suspected child labourers. However, biological age of the living cannot be correctly estimated in adult individuals older than 25 years[7]. In older individuals, fusion of cranial sutures is taken into account.

Poisoning and Drug Trafficking

Metallic Poisoning e.g. Lead, Arsenic

Lead lines may be seen as opaque densities at the metaphyses of long bones and along margins of iliac crest in children, which are useful in the diagnosis of chronic lead poisoning [8]. Radio-opaque poisons like arsenic can be visualised in the GIT on a plain Abdominal X-Ray. In the present day and age, the incidence of chronic lead poisoning has declined, perhaps because lead water pipes are no longer used and unleaded petrol has been introduced. Chronic arsenic poisoning still occurs in parts of West Bengal and Bangladesh due to contaminated ground water[9].

Body Packing

A 'body packer' is a human drug carrier who swallows specially prepared drug packets in order to evade detection of illicit narcotic drugs while smuggling them across borders in the gastrointestinal tract. The commonly used drug packets are conventional "condom packages' or newer "pellets" with multiple layers of polyethylene food wrapping, tape and plastic bags with an average length of 4.5 cm and mean diameter of 1-2 cm.[6] These packets can be identified on a Plain Abdominal Radiograph or Computed Tomography (CT) Scan by an experienced radiologist.

Post-Mortem (in the Dead)

Radiological and imaging techniques are a valuable resource in the forensic diagnosis of cause of death. A comparison of antemortem and postmortem radiographs can aid in personal identification of the deceased, especially in mass disasters. In some situations, the trauma or disease which resulted in death may be visualised even before an autopsy is done. A whole body x-ray can be performed in cases of firearm injuries to localise the anatomical region where bullets/pellets are lodged.

Identification of Human Remains

Radiological procedures often assist in identification of individuals when visual recognition

may be next to impossible (in traumatised, dismembered or disfigured bodies). In cases of severe tissue damage and mutilation, radiology may become the primary and often the only means of positive identification. However, in most victims, antemortem radiographs must be available for direct comparison [6]. The usual practice is to compare pre-existing films from a potential matching subject with post-mortem films of the deceased unknown person taken during autopsy[10].

Correlation of Ante-Mortem and Post-Mortem X-Rays is Based on

- Individual anatomical variations, e.g. skull, spine, frontal sinuses
- Specific abnormalities, e.g. old fractures, deformities, callus formation, congenital anomalies or infective changes
- Foreign bodies seen radiologically, e.g. joint prosthesis, femoral pins or plates, metal sutures and surgical clips.

Radiographic Measurements like cephalometry and pelvimetry also assist in identification[11]. In one case, the dental radiographs of an alleged missing person were obtained from her dentist and matched those of a deceased female whose body was found buried on a hillside. This led to the conclusion that both the x-rays belonged to the same individual.

Cause of Death

Detection of Trauma and Haemorrhage

In forensic postmortem practice, the bulk of cases comprise road traffic accidents, falls from height and assaults with sharp/blunt weapons, all of which can result in extensive bodily injuries. Fractures and dislocations of bones and teeth are clearly visible on a good x-ray film. Hairline fractures, which may be missed during autopsy, are well delineated by imaging techniques. This assists in accurate documentation of trauma and cause of death. Intracranial haemorrhage in the extradural, subdural and subarachnoid spaces, as well as internal haemorrhage in the pleural, pericardial and peritoneal cavities can be detected with the aid of a CT scan[12]. MRI, on the other hand, is more useful for identifying soft tissue injuries, for example in a case of hanging or strangulation, to visualise underlying damage to the soft tissues of the neck. In fatalities due to choking, the foreign body may be visible in the larynx on a lateral view of a plain radiograph of the neck region. In some cases of electrocution, typical round density foci called 'bone pearls' or 'wax drippings' may be observed radiologically[13]. These are caused due to melting of Ca_3PO_4 by heat generated from the current. Evidence of air embolism consequent to suicidal or homicidal cut throat injury can be appreciated on x-ray as bubbles in the venous system, great veins of neck, inferior vena cava and heart. Fractures of the hyoid bone or thyroid cartilage in violent asphyxial deaths are also similarly demonstrated.

Death Due to Firearm Injuries and Missiles

In firearm injuries, missiles in the body (being radio-opaque) can be accurately localised with the help of X-Rays. This saves time, effort and tissue damage due to extensive dissection while searching for the bullet, which can be a tedious task[8]. The number of bullets within the body must be correctly recorded as the forensic specialist may have to give an explanation if it does not correspond with the number of entry wounds noted in the postmortem report. Moreover, bullets and pellets carefully recovered and preserved can be produced as evidence in subsequent legal proceedings. Explosives and parts of the bomb mechanism embedded deep within tissues can be detected on X-Ray in the case of blast injuries.

Radiological procedures may unravel concealed crimes and causes of death not initially suspected. For instance, a mutilated body discovered at the crime scene had actually sustained gunshot wounds, as the pre-autopsy radiographs revealed. In an incident in Shillong, a charred body was found inside a car with the suspicion that the deceased individual had been killed prior to being set on fire. In such a case, radiology helps to confirm or exclude possible causes of death like firearm and other mechanical injuries.

The detection of metallic substances at the site of injection or at their final place of lodgement e.g. gastro-intestinal tract is aided by imaging techniques[8]. In a sensational case, a metallic sphere 0.3mm in diameter containing the poison "RICIN" was introduced into the tissues of a Bulgarian newsreader in France, which proved to be fatal. The autopsy revealed a tiny pellet in the thigh with two small holes bored into its casing[14].

Sudden Natural Death

CT and MRI are helpful in the diagnosis of natural causes of death such as myocardial infarction, ischaemic heart disease, coronary atherosclerosis,

pulmonary embolism and pneumonic consolidation [12]. Subarachnoid haemorrhage due to natural causes (rupture of a berry aneurysm), infarcts and clots may show up on a scan of the affected region (head, thorax, abdomen, or extremities). In a suspected case of pneumothorax, the presence and extent of air in the pleural cavities can be seen on a pre-autopsy radiograph. Although the gold standard for diagnosis of most causes of sudden natural death is gross and histopathological examination, e.g. myocardial infarction, imaging methods could have a supportive role if done prior to the autopsy.

Virtual Autopsy (Virtopsy)

This refers to the use of modern imaging technology such as multislice computed tomography (MSCT) and magnetic resonance imaging (MRI) to establish an examiner-independent, three dimensional (3D), objective and reproducible forensic assessment method, eventually leading to minimally invasive "virtual" forensic autopsy[15].

'Virtopsy' could be a possible (futuristic) option when family members or public object to the conventional autopsy for cultural or religious reasons. In Shillong, a good number of medicolegal deaths, including road traffic accidents, are exempted from postmortem examination by the Deputy Commissioner of the district, at the request of the relatives. In such situations, a procedure which causes little disfigurement or mutilation may receive more public acceptance. It is a rapid identification tool in mass disasters. Moreover, it could receive better compliance for cases involving children or infants. As it is minimally invasive, it would also cut down exposure of dissectors to infection while dealing with deceased victims of tuberculosis or AIDS.

The main disadvantage of utilising this technology on a regular basis is the high cost and specialised training involved. There may be ethical issues when the same CT/MRI machine is used for living patients and dead bodies. A centre like ours with constrained infrastructural resources can ill afford to have a dedicated forensic imaging unit. At best, portable x-ray equipment could be utilised for medicolegal purposes.

Virtual autopsy has its limitations in cases of poisoning and natural death, when tissue samples have to be obtained for chemical or histopathological analysis. Postmortem changes such as putrefaction can present specific difficulties for imaging diagnosis [16]. As yet, it cannot replace a classical autopsy, but could serve as a complementary investigation,

Fig. 1: Radiograph showing epiphyseal union at the shoulder joint (448 x 336 px)

Fig. 2: Radiograph showing fracture of shaft of humerus, a grievous injury (448 x 336 px)

Fig. 3: This antemortem x-ray can be compared with a postmortem film to fix/exclude identity (448x 336 px)

combined with all normal surgical or pathological techniques. In select cases, it may be used as a pre-autopsy screening tool to reduce the number of unnecessary and invasive postmortem examinations.

Summary

Radiology has often aided in solving forensic problems in both clinical and postmortem situations. X-rays are particularly helpful in age estimation of living individuals and in determining cause of death due to firearms. Radiologists and forensic specialists have to work hand in hand while forming the opinion in medicolegal cases where imaging techniques have been employed. Records of forensic x-ray, CT and MRI films, preferably in digital format, are to be retained indefinitely, or until the case is finalised in court. In recent years, the idea of a 'virtual autopsy' has been conceived and could pave the way for minimally invasive postmortems of the future.

Acknowledgement

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Case Report

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Burst Abdomen (Acute Wound Failure) As A Complication of Corrosive Acid Poisoning- An Unusual Case Report

Das Abhishek*, Biswas Sujash, Mahanta Tanay***, Bandyopadhyay Chandan**, Dalal Deepsekhar*, Sukul Biswajit******

Abstract

Corrosive poisons, alkaline and acidic, cause tissue destruction by dehydration and necrosis. Early complications are curable less consumption and early interventions. Patients die from direct or surgical complications due to severely damaged pharynx, oesophagus, stomach and larynx.

Postoperative disruption of abdominal musculo-aponeurotic layers is called burst abdomen (acute wound failure / wound dehiscence) which is among most alarming postoperative complications, mostly seen after emergency and exploratory laparotomy.

A 27 years male was admitted with corrosive acid ingestion presenting as fever, hematemesis, melena and dysphagia. Exploratory laparotomy was done for gastric perforation repair with feeding jejunostomy with throughout broad spectrum antibiotic coverage. On second post-operative week, burst abdomen (acute wound failure) was evident and he was operated again. But with further deterioration ultimately he died after one month.

Early endoscopic intervention with surgical management under proper precautions with maintenance of proper nutrition are utmost necessary for treatment of patients of corrosive poisoning to prevent immediate or early demise as well as irreversible late complications like malnutrition, dysphagia and oesophageal stricture.

Keywords: Corrosive; Burst Abdomen; Dehiscence; Laparotomy; Postoperative Complications.

Introduction

Suicidal and accidental fatality from corrosive poisoning is not uncommon in present days both in rural and urban settings. Corrosive poison ingestion causes both acute and chronic injury starting from tissue injury or perforation due to dehydration and necrosis upto stricture and dysphagia as late sequellae. Often surgical complications pose dreadful situations and risks patient's life as maintenance of proper nutrition or infection control falls short. Authors report an unusual case of death due to ingestion of corrosive acid due to late complication as burst abdomen which was confirmed by autopsy.

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Case History

A 27 years old male was admitted in the Medicine department of a tertiary care hospital via two rural health centres with fever, hematemesis, melaena dysphagia and odynophagia due to corrosive acid ingestion about 40hours back. He was treated conservatively with oral feeding along with total parenteral nutrition (TPN) but did not respond well. Upper GI endoscopy with barium meal follow through revealed gastric and intestinal perforation and exploratory laparotomy was done for repair with abdominal drain insertion and feeding jejunostomy. As the condition was not improving, he received four (4) units of blood transfusion and TPN was continued with feeding through jejunostomy. Even under broad spectrum antibiotic coverage, fever persisted. In the second post-operative week, burst abdomen was noted for which re-surgery was done

with evident oedematous gut. The patient deteriorated more with time and he expired on 28th day of surgery.

Fig. 1: Ulcerated area over anterior abdominal wall

Fig. 2: Inflammation & excoriation of mucous membrane of both lips and oral mucosa

Fig. 3: Infected and ulcerated surgical wound

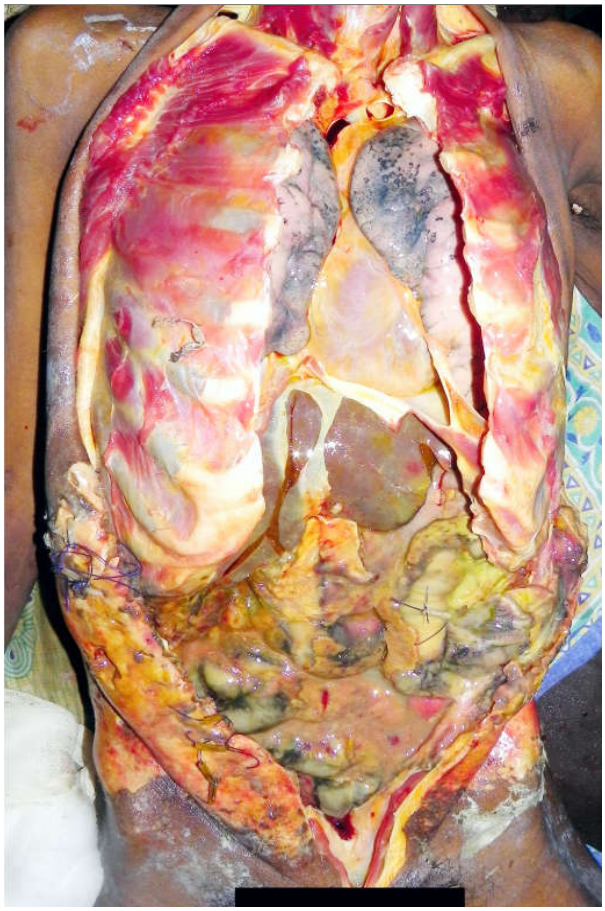

Fig. 4: Peritonitis and adhesion of peritoneum with intestinal coils and other adjoining organs

Fig. 5: Shrunken fibrosed thickened stomach wall with gross haemorrhage and evidence of repair

External Autopsy Findings

Thin emaciated dead body with bed sores with pus points present over back of chest, abdomen and buttocks. Rigor mortis passed off. Inflammation and excoriation of mucous membrane of both lips & oral mucosa noted.

One ulcerated area 9.5inch x12inch over anterior abdominal wall present with 7inch long surgical incision starting from 3.5inch below xiphisternum on midline extending vertically downwards and closed with 11 non-continuous stitches with soft plastic tube collars inserted within each. The area is congested, inflamed and infected with sporadic pus points and marginal granulation tissue. There is gaping of rectus sheath along the length of incised wound exposing the underlying structures inside abdominal cavity, notably intestinal coils and omentum. The stitched area and surrounding are thinned out, sodden and stitches can be removed easily by tearing the tissues with a gentle traction. Evidence of insertion of abdominal drain and feeding jejunostomy tube was noted as wounds over right and left lumbar region respectively.

Internal Autopsy Findings

Scalp and skull was healthy. Brain and thoracic organs were congested. Abdominal dissection revealed congested peritoneum with features of chemical peritonitis and subsequent adhesion of peritoneum with intestinal coils & other adjoining organs. Stomach showed thickened, shrunken and fibrosed wall with gross submucosal haemorrhage containing 30ml brownish yellow fluid with evidence of perforation repair. Liver, spleen and intestinal coils were reddish black in colour with evidence of pus formation mixed with liquid blood and turbid peritoneal fluid. Mucosa of pharynx and oesophagus were congested.

Discussion

Corrosive acids cause potent desiccation with coagulation necrosis of tissues in contact. Apart from the pH of acid, molarity, concentration and affinity towards hydroxyl ions and time of exposure contribute to the tissue destruction. Ingestion of acid causes more damage to stomach than oesophagus as the squamous epithelium of the later is more resistant to acids [1]. Accidental poisoning is seen mainly in children, while deliberate suicidal attempts with consumption of larger volume are seen in teenagers and adults, as alleged in present case. It causes acute effects like immediate necrotic phase and perforation to stricture due to cicatrisation and scarring as chronic complications passing through intermediate ulceration and granulation phase. Presence of fever strongly correlates with oesophageal injury as evidenced in present case along with lesion in oral cavity and pharynx. An early oesophagoscopy helps to identify the tissue damage but occasionally it increases the chance of perforation further [2]. Presence of perforation and extensive necrosis need immediate surgical repair and resection. Various postoperative complications may deteriorate the situation further. Burst abdomen (acute wound failure / wound dehiscence) is a relatively rare dreadful abdominal surgical postoperative complication characterized by disruption of abdominal musculo-aponeurotic layers occurring in 1% to 3% cases. It is seen in 6^{th} to 8^{th} postoperative day mostly (range 1 to 20 days) as also found in present case. Technical error in suture placement area being too close or far apart, infection, emergency surgery, malnutrition, increased intra-abdominal pressure are predisposing factors. Interrupted sutures yield better result than continuous sutures [3]. It is responsible for about 16% mortality rate with or without intra-abdominal organ protrusion (evisceration). Regular dressing till the formation of sufficient granulation tissue is necessary [4]. But in this case only marginal granulation tissue was formed which supports critical condition of the patient. The post-mortem finding of discoloured brownish gastric mucosal folds containing brownish fluid strongly suggests corrosive acid poisoning [5].

Conclusion

Cases of corrosive poisoning should be taken care of with immediate resuscitative measures especially in intensive care unit setup, prompt investigations and surgical intervention to save the life of the patient. Patient must be followed up for subsequent correctional measures to control postoperative complications and stricture formation as late sequel. Alternative sufficient nutritional support must be advocated as this type of patient suffers from malnutrition due to inability to take food and its digestion.

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Short Communication

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White Collar Crimes

Prateek Rastogi

Abstract

White collar crimes or the crimes committed by high profile individuals are more prevalent now a days involves almost all professions and business. Crimes like fraud, overcharging, black marketing, bribery, tax evasions etc are included under white collar crimes. These crimes more dangerous than blue collar crimes as they are deeply infilterated into the system and cause more long lasting harms.

Keywords: White Collar Crimes; Blue Collar Crimes.

White collar crimes refer to the crimes committed under disguise of business or profession. This term include frauds in business, frauds in investments, bribery, adulterations, tax evasions, embezzlement, copyright infringement, overpricing, over charging, selling wrong products, selling or marketing low quality product, political corruption, capitation fees etc.[1,2]This entity is less known as compared to traditional blue collar crimes like robbery, theft etc. White Collar crimes are more soothing to the society as the perpetrators are usually politicians, bureaucrats, businessman, shop keepers, doctors, lawyers, engineers and other respectable citizens of society and thus these crimes are usually accepted as part of business or profession. White collar crimes are also prevalent in medical profession like issuing false certificates, dichotomy, covering, wrong associations, selling or prescribing overpriced drugs.

White collar crimes are usually double sided, they are not only committed by the perpetrator but are also sometimes facilitated by the sufferer eg.taking bribe is a white collar crime but at the same time people pay bribe in order to get their work done, Chartered accountants prepare false documents and income tax officials may accept bribes to help a person evade tax. Thus, these crimes are less reported as they are more directed towards the group of people, society or country as a whole but rarely towards an individual.

Government have framed various laws and regulations to control white collar crimes: Foreign exchange regulations Act 1947, Imports and Exports (Control) Act 1947, Essential commodities Act 1955, Companies Act 1956, Central Sales Tax Act 1956, Income Tax Act 1961, Customs Act 1962, Prevention of Corruption Act.

In general blue collar crimes affect only a persons or two at a time but white collar crimes affect the society. Still majority of times these white collar crimes go unpunished due to various reasons .

1. High social status of criminals – Big business tycoons eg. kingfisher group, sahara group which are currently implicated for business frauds.
2. Political affiliations- Big politicians – eg. 3G scam, Fodder scam Vyapam scam, Asian games scam.
3. Unorganized public opinion on this issue, along with public contribution to these crimes eg. bribing, demand for illegal goods, purchase without bills.
4. No proper preventive or corrective measures available.
5. Commission of offence is usually noticed later and by then the evidences might be destroyed.
6. Lenient judicial approach as these crimes are not usually taken seriously.

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The usual theories which explain the ordinary crimes like need, bad environment, feeble mindedness usually fail to explain these crimes as the perpetrators are rich, sharp minded individuals. The exact data for these crimes is misleading as lot of times are not reported or underreported. White collar crimes are infact more dangerous than blue collar crimes as these are deeply infilterated into the system and society, cause more long lasting harms, are difficult to locate and control.

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