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Changing Trends of Suicides in Marathwada Region of Maharashtra in Central India: A Retrospective Study

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Abstract

A retrospective study was conducted at Swami Ramanand Teerth Government Rural Medical College, Ambajogai which is a rural based tertiary care hospital where all deaths near places were carried out for post mortem examination. The study duration was period between January 2011 - December 2015. The prime objective of the study was to project the changes in methods/trends of suicides in rural marathwada region as hanging ranked as a leading method of suicide in spite of poisoning and others as well as to evaluate the magnitude of problem within the area of study and to determine the relevant factors associated with hanging cases.In the study, total 620 postmortem cases of hanging victims which were reported by and to government authority regarding deaths included in farmer's suicide. The nature of hanging in all the cases was suicide. Males constituted 70.3% of the cases. Age wise, 55.48 % of cases fell within 20-40 years. Family disputes were the most common factor cited as the reason for the act in 52.2% of cases. Most of the subjects were married (76.7%) and with relation to studies, 55.2% were educated. With regards to occupation, 41.93% cases constituted farmers. 54.8% cases hailed from rural area. As with the time of hanging, in 52.9% of the cases, the incidence happened between 12 AM – 6 AM and the place of incidence was farm house in 93.5% of cases. With the choice of ligature material, synthetic ligature material (47.74%) was the most commonly used ligature material by hanging victims. There are many similarities and differences were seen during this study.

Keywords: Hanging; Suicide; Retrospective Study.

Introduction

Hanging is the form of violent mechanical asphyxial death, caused by constriction of the neck, as a result of suspension of the body, where the constricting force is the weight of the body.

To cause hanging, full suspension of the body is not always required. Hanging is one of the leading causes of death in the world. It accounts for more than a million deaths annually [1].

In India, hanging is the most common method of committing suicide, as its offers a rapid and relatively painless death and there is no cost involvement other than that of the ligature material [2].

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According to the NCRB (National Crime Reports Bureau) reports, the incidence of suicide by hanging increasing every year in India, 31.5 % in 2010, 33.2 % in 2011, 37.0% in 2012. Statistics show that India has the highest suicide rate in the world, marginally behind China, but ahead of the west [3]. For men 40% of suicides were among people of age group 15-29. For women, it was nearly 60%. About 95-100 people commit suicide in India every day [4].

Subjects and Methods

This study was conducted at Swami Ramanand Teerth Government Rural Medical College, Ambajogai from January 2011 - December 2015. All hanging cases received in this study period were included and asphyxial deaths other than hanging (eg) strangulation, bodies showing advanced decomposition changes were excluded. Data were collected through case records, detailed history from the police and the relatives of the victim, using a standard proforma which included age, sex, occupation, place of residence, place of occurrence, type and circumstances of hanging of the cases

among other details. The overall collected data was compiled and descriptively studied putting it into tables, figures and graphs. It was then statistically studied using percentage & ratio analysis and finally inferences were made.

Results

Before stating the results, if we see the year wise deaths due to hanging and poisoning, there is relative increase in number of hanging cases.

Out of 620 cases, males accounted for 530 (85.48%) cases and females accounted for 90 (14.59) cases. Age of the victims was broadly grouped in to ten years range and the youngest victim noted was of the age 11 years and the oldest one was 72 years old. The 41-50 years age group, constituted 240 (41.93%) cases, accounting for the maximum number of cases, followed by 31-40 years group 140 (21.58%) cases [Table 2]. With regard to the marital status, 540 (87.09%) cases were married and unmarried victims were 70 (11.61 %) cases [Table 3]. 590 (95.16%) cases belonged to rural area and 30 (4.83 %) cases were from urban [Table 4].

Education wise, it was found that 312 (5.32%) cases were uneducated, 85 (13.70%) cases had education of elementary school standard followed by high school education drop out in 162 (26.12%) cases [Table 5]. With regard to occupation, most of the victims were farmers 514 (82.90%) cases, followed by house wives 55 (8.87%) cases and students were with 35 (5.64%) cases [Table 6]. On eliciting the detailed history from the police and relatives of the deceased majority of the cases, the site of incidence was farm house/ surrounding place with 590 (95.16 %) cases [Table 7]. With the time of hanging, most of the cases took place at midnight around 12 AM – 6AM (94.35%) cases [Table 8]. It was found that the most common reason of hanging among these cases were loan from bank and private loan from savkar with 514 (82.89%) cases followed by family disputes 35 (5.64 %) cases and motive could not be elicited in 29 (4.67 %) cases [Table 9]. Synthetic nylon rope was the most common ligature material used in 313 (50.48 %) cases followed by dhoti in 181 (29.19%) cases and saree in 110(17.74 %) cases [Table 10].

Discussion

In this study, cases in age group between 41-50 years accounted for the maximum number, with 41.93% of all cases. The observation made with regards to age in hanging cases were documented by

Table 1: Total number of cases for comparison

Year	Hanging Cases	Poisoning Cases
Jan 2011- Dec11	90	110
Jan 2012- Dec 12	114	106
Jan 2013- Dec 13	129	110
Jan 2014- Dec 14	134	116
Jan 2015- Dec 15	153	102
Total	620	544

Table 2: Age & sex wise distribution of cases

Age group(yrs)	Males	%	Females	%	Total
0-10	0	0	0	0	0
11-20	65	12.26	15	16.66	80
21-30	53	10	7	7.77	60
31-40	130	24.52	10	11.11	140
41-50	215	40.56	45	50.00	240
51-60	35	6.06	10	11.11	45
60 onwards	32	6.03	3	3.33	35
Total	530	85.48	90	14.59	620

Table 3: According to Marital Status

Status	Cases	Percentage
Unmarried	70	11.61
Married	540	87.09
Divorce	07	1.10
Spouse dead	03	0.48
Total	620	100

Table 4: According to area wise

Area	Cases	Percentage
Rural	590	95.16
Urban	30	4.83
Total	620	100

Table 5: According to Literacy Status

Literacy Status	Cases	Percentage
Illiterate	312	50.32
Elementary	85	13.70
Elementary drop out	90	14.51
High school drop out	72	11.61
Graduates & Above	41	6.61
Unknown	20	3.22
Total	620	100

Table 6: According to Occupational Status

Occupational Status	Cases	Percentage
Farmers	514	82.90
Housewife	55	8.87
Students	35	5.64
Unemployed	09	1.45
Service	05	0.80
Unknown	02	0.32
Total	620	100

Table 7: According to Place of Suicide

Place of Suicide	Cases	Percentage
Farm house	590	95.16
Home	15	2.41
Custody	03	0.48
Work Place	10	1.61
Hospital	02	0.32
Total	620	100

Table 8: According to Time Period of Suicide

Time	Cases	Percentage
Morning (6AM-12PM)	10	1.61
Afternoon (12PM-5PM)	10	1.61
Evening (5PM-10PM)	15	2.41
Midnight (12AM-6AM)	585	94.35
Total	620	100

Table 9: According to reasons for hanging

Reasons	Cases	Percentage
Loan from bank	447	72.09
Loan from savkar (Private banker)	67	10.80
Family disputes	35	5.64
Mental illness	12	1.93
Exam failure	13	2.09
Love affairs	17	2.74
others	29	4.67
Total	620	100

Table 10: According to ligature material

Ligature material	Cases	Percentage
Dhoti/Lungi	181	29.19
Nylon rope	313	50.48
Saree & dupatta	110	17.74
Others- cable wire, metal wire	16	2.58
Total	620	100

Patel AP et al [5] (32.98%) and Vijayakumari N et al [6] (38.5 %) respectively will differ Whereas Azmak D et al [7] reported that most of the cases in his study were between the age group of 30–39 years (20.8%).

The study showed male preponderance with males accounting for 85.48 % of all the cases. Similar to the study, Momin SG et al [8] reported 66.6% were male cases with male: female ratio of 1.5:1. However Saisudeer T et al [9] reported in his study that maximum case were females. India being a patriarchal society, the male preponderance in the study could be explained as males are expected to shoulder the burdens of life and their responsibility as the main or on most times, the sole bread earner of the family. Our study showed 87.09% of cases were married individuals. Saisudheer T et al [9] also reported similar findings of 82% in their study. In this study, among 90 females, 75 (12.09%) cases were married due to torture of in laws and in unmarried girls; reason is being failure in exam or scolded by parents.

The reason could be stress associated with marriage, dowry problems, dependency, interpersonal problems with spouse and his relatives etc. which pose major problems among Indian women at this period.

It was noted that 312 (5.32%) cases had no education, 85 (13.70%) cases had education of elementary school standard followed by high school education drop out in 162 (26.12%) cases. Similar findings were reported in the study by Samanta AK et al [10] that 45.7% cases had no education.

With regard to occupation, most of the victims were farmers 514 (82.90%) cases, followed by house wives 55 (8.87%) cases and students were with 35 (5.64%) cases. These findings are consistent with the study done by Samanta AK et al [10].

Majority of the victims belonged to rural area 590 (95.16%) cases. The cause of the higher rates among rural population in this study could be poverty, poor educational status, unemployment and lack of awareness about the value of life.

On detailed history from the police and relatives, the place of incidence of hanging in the study were mostly farm house with 590 (95.16%) of cases here, Ahmad et al [1] and Sharija S et al [11] reported in their study that most of hanging cases were found hung in indoor places in 97.93% & 71.27% respectively which will differ from this study.

12 AM–6AM was noted to be the time for occurrence of maximum hanging cases with 94.35% of all the cases. The reason could possibly be that in this period, most of the people are in sleep and thus facilitating hanging without hindrance. Similar findings were noted by Ahmad et al[1]. However Vijayakumari N et al [6] noted the time of hanging was mostly during the early hours of the day around 3 AM – 12 noon (50.8% cases) in her study.

The most common reason for hanging among these cases were loan from bank and private loan from savkar with 514 (82.89%) cases followed by family disputes 35 (5.64%). These findings were documented by Vijayakumari N et al [6]. The mental illnesses contributed 23.87 % in this study. However, this finding was not noted in the studies by Vijayakumari N et al [6] (6.2%) and Ahmad et al 1 (6.89%) cases which will differ from present study. Competitive life, financial problems, interpersonal problems and dysfunctional families, were other reasons related to hanging in this study.

The most commonly used ligature materials for hanging was synthetic nylon materials constituting 50.48% cases. These findings were differ with study of Vijayakumari N et al[6]. Dupatta was the most commonly used ligature in the studies done by Patel AP et al [3], Ahmad et al [1], but in the larger context, similar to this study, softer materials are being more commonly used than the harder ones. This could be because, suicide being often an impulsive act, the victim uses whatever material available nearby during that particular period of time.

The study also reported 5.6% of the cases were of above 60 years which was found to be associated with neglect and poverty as well as 11 years male child being the youngest one who was demonstrating to his younger brothers the way of committing hanging by putting ligature material around the neck twice before, he died by hanging this time.

Conclusion

Hanging persists to be a major cause of loss of life in marathwada region. It is one of the common modes of suicide especially in the middle aged population with male preponderance.

Family disputes pertaining to marital disharmony, mental illness, unemployment are the major causative factors for suicidal hanging but in this study these factors remains far away, as no agricultural production, no rains, drought like condition, economic imbalance and personal problems like marriages of daughter, loan from bank as well as from (Savkar/ Private Banker ??) leads the causative factor.

As in marathwada region, no big water-dams or water resources are available which can percolate the water or easily available if there is no rain in this region.

People mostly resort to hanging using easily available clothes as ligature in the confines of their farms. Literacy has an inverse relation with suicidal behaviour as people with no or less education are more prone for committing suicide by hanging. This calls for a well designed and comprehensive programme involving medical, non medical persons like NGOs, social workers, media and the Government to identify and tackle the causative reasons amongst the people to prevent precious loss of life to such a preventable cause.

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Study of Pattern of Road Traffic Accidents and Detection of Alcohol in Vitreous Humor as an Evaluation Tool: An Autopsy Based Study

Sudeepa Das[1], Ashim Mishra[2]

Abstract

Background: Exponential increase in road traffic accident cases are a major cause of concern all over the world .The fatality of accident cases depends on various factors and alcohol consumption can also be associated to increase in incidence of road traffic accidents. *Materials and Methods:* An autopsy based study on victims of road traffic accidents was carried out in the department of Forensic Medicine, M.K.C.G Medical College, Berhampur, Odisha. The vitreous samples were tested qualitatively for presence of alcohol by potassium dichromate test. The stomach contents and the blood and urine sample sent to RFSL for chemical analysis. *Result:* A total number of 918 autopsies were done during the study period and 250 cases (27.23%) were due to road traffic accidents. 86% were males and belonged to 31-40 years (23.6%). Pedestrians comprised the 51.6% of the victims. 42 % of the victims sustained fatal head injuries (42%) followed by 36.8% of cases sustaining multiple injuries.20% tested positive for qualitative estimation of vitreous alcohol. Out of 21 victims of drivers of 2/3 wheelers 15 71.43% tested positive for alcohol. Out of 50 vitreous positive cases, alcohol was detected in in blood, urine and stomach samples in 60%, 40% and 20% cases respectively. Vitreous alcohol was positive even after 12 hours. *Conclusion:* A significant number of victims of road traffic accidents showed positive detection of alcohol in their vitreous sample proves alcohol as one of the important factor in incidence of accidents. The vitreous sample was a better sample than blood, urine and viscera in qualitative detection of alcohol.

Keywords: Road Traffic Accidents; Vitreous Humor; Alcohol.

Introduction

A Road Traffic Accident (RTA) is when a vehicle collides with another vehicle, pedestrian, animal or geographical or architectural obstacle [1]. From the first motor vehicle accident in 1771in Paris by Cugnot's steam tractor to the present, the road traffic accidents are increasing day by day due to rapid industrialization and urbanization. Accidents are considered a veritable epidemic disease which can be prevented if appropriate measures are taken to check the causative factors. Injuries cause the death of over five million people around the world each year despite no longer being perceived as unavoidable but largely preventable events [2]. In depth studies of fatal vehicular accidents provide valuable data for implementing effective emergency services to reduce the trauma related mortality and strengthening legal measures in peak hours of fatal accidents [3].

Various studies in our state were done on injury patterns but very few studies have been done to relate vitreous alcohol with road traffic accidents. Although done in recent past, this study was done with an objective to study the pattern of road traffic accidents with emphasis on qualitative detection of alcohol in vitreous humor as an evaluation tool and corroborate with findings of chemical analysis of other body fluids and viscera.

Material and Methods

The autopsy based study was carried out in the department of Forensic Medicine, M.K.C.G Medical

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College, Berhampur with a cross sectional design. All victims with definite history of road traffic accidents brought for autopsy during the period 1st January 1998 to 31st December'1999 were included in this study. The doubtful cases were excluded from the study. The detailed analysis of 250 cases was based on the inquest report, available medical records, autopsy findings and chemical analysis report. Other epidemiological parameters were obtained from the history taken by police and his/her relatives present. A clear transparent sample of vitreous humor was aspirated with a 5ml hypodermic needle, 5 cm away from outer canthus of eye and tested qualitatively for presence of alcohol by potassium dichromate method. The color change in solution from orange to green was taken as positive and no color change was indicative for negative test. The stomach contents, blood and urine sample were sent to RFSL for chemical detection of alcohol. The data thus obtained was entered on excel spread sheet and analyzed statistically for calculating different percentages.

Results

Out of 918 autopsies conducted during the study of one and half year, 250 cases (27.2%) were due to road traffic accidents. Majority of the victims were males (86%) (Table-1). Most of the victims belonged to 31-40 years (23.6%) followed by 41-50 years (23.2%)(Table 1). Pedestrians comprised the maximum number of the victims (51.6%) and the least number of victims were pillion drivers (2.8%) (Table-2). It has been observed that all the victims sustained fatal head injuries (42%) followed by 36.8% of cases sustaining multiple injuries.50 victims (20%) tested positive for qualitative estimation of vitreous alcohol out of which 13 victims (26%) were pedestrians. Out of 21 victims of drivers of two wheelers, 15 (71.4%) tested positive for alcohol (Table 3) .

Our study revealed that in male population, 40.43% of 21-30 years had vitreous positive for alcohol followed by 35.09% of cases who belonged age group of 31-40 years (Table 4).

Table 1: Age and sex preponderance of road traffic victims

Age Group	Male (%)	Female (%)	Total (%)
0-10	6(2.8)	5(14.2)	11(4.4)
11-20	21(9.8)	1(2.9)	22(8.8)
21-30	47(21.8)	8(22.9)	55(22)
31-40	57(26.5)	2(5.7)	59(23.6)
41-50	48(22.3)	10(2.9)	58(23.2)
51-60	23(10.7)	7(20)	30(12)
61-70	11(5.1)	2(5.7)	13(52)
>70	2(0.9)	0(0)	2(0.8)
Total	215	35	250(100)

Table 2: Fatal injury pattern and types of victims of RTA

Type of victims	Chest (%)	Abdomen (%)	Head and Neck (%)	Limbs (%)	Multiple injuries (%)	Total
Pedestrians	10(7.8)	5(3.8)	59(45.7)	7(5.4)	48(37.2)	129(100)
Cyclists	2(9.6)	0(0)	10(47.6)	1(4.8)	8(38)	21(100)
2 /3wheelers drivers	0(0)	0(0)	10(47.6)	4(19)	7(33.3)	21(100)
Pillion riders	0(0)	0(0)	5(71.4)	1(14.3)	1(14.3)	7(100)
4 wheeler drivers	2(14.3)	3(21.4)	3(21.4)	1(7.1)	5(35.7)	14(100)
Occupants of 4 wheelers	6(10.3)	7(12.1)	18(31)	4(6.9)	23(39.7)	58(100)
Total	20(8)	15(6)	105(42)	18(7.2)	92(36.8)	250(100)

Table 3: Distribution of RTA victims tested positive for alcohol and age

Age(years)	Pedestrian (%)	Cyclist (%)	Two wheeler driver (%)	Pillion driver (%)	Four wheeler driver (%)	Occupants (%)	Total (%)
0-10	0	0	0	0	0	0	0(0)
11-20	0	0	0	0	0	1(100)	1(100)
21-30	5(26.2)	1(5.3)	6(31.6)	0(0)	1(5.3)	6(31.6)	19(100)
31-40	7(35)	1(5)	5(25)	0(0)	1(5)	6(30)	20(100)
41-50	1(16.7)	0(0)	2(33.3)	0(0)	0(0)	3(50)	6(100)
51-60	0(0)	0(0)	1(33.3)	1(33.3)	0(0)	1(33.3)	3(100)

61-70	0(0)	0(0)	1(100)	0(0)	0(0)	0(0)	1(100)
>70	0	0	0	0	0	0	0
Total (%)	13(26)	2(4)	15(30)	1(2)	2(4)	17(34)	50(100)

Table 4: Sex and age wise distribution of victims of RTA tested positive for alcohol in vitreous humor

Age group in Years	Sex	total number of victims	No. of vitreous alcohol positive cases	Percentage vitreous alcohol positive cases
0-10	Male	6	0	0.00
	Female	5	0	0.00
11-20	Male	21	1	4.76
	Female	01	0	0.00
21-30	Male	47	19	40.43
	Female	8	0	0.00
31-40	Male	57	20	35.09
	Female	02	0	0.00
41-50	Male	48	4	8.33
	Female	10	2	20.33
51-60	Male	23	2	8.70
	Female	07	1	14.29
61-70	Male	11	1	9.90
	Female	02	0	0.00
>71	Male	02	0	0.00
	Female	0	0	0.00
Total		250	50	20.00

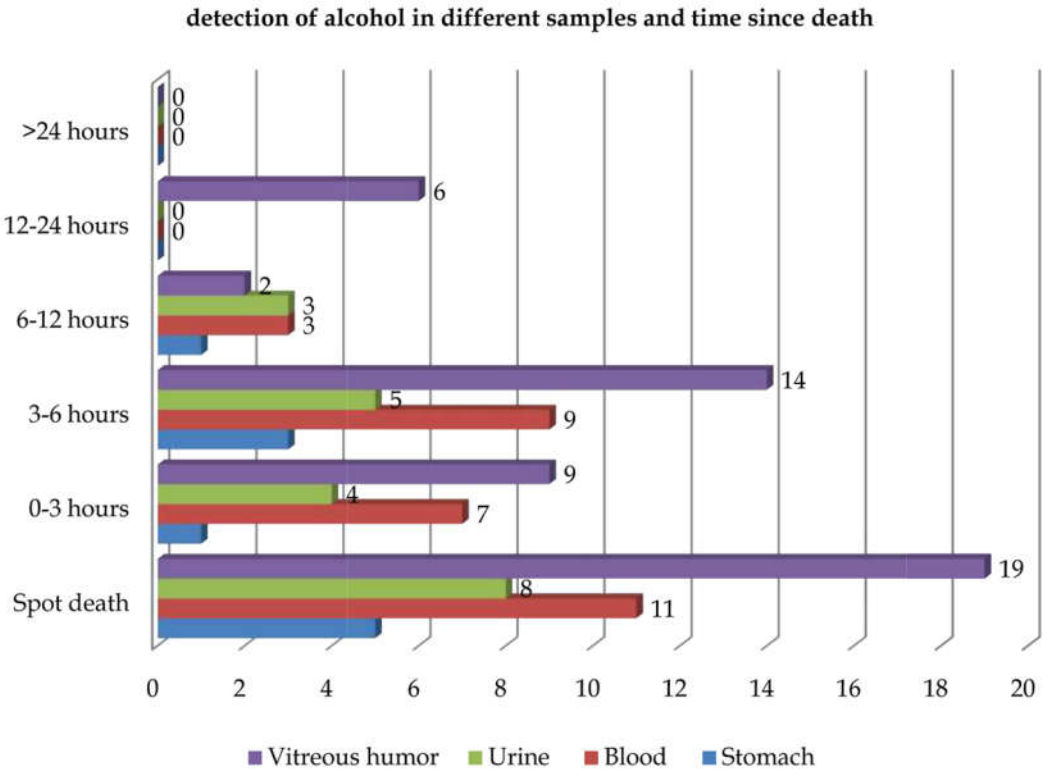

Fig. 1: Time since death and number of cases showing positive for alcohol in different samples

Amongst 50 vitreous positive cases, alcohol was detected in blood, urine and stomach samples in 30(60%), 20(40%) and 10(20%) cases respectively (Figure 1) Vitreous alcohol was positive even after 12 hours but within 24 hours of time since death. There was not a single case where vitreous in negative for alcohol and alcohol detected in other samples (Figure 1).

Discussion

The main aim of the study was to study the pattern of road traffic accidents with relation to variables like age, sex, type of victims and type of injury sustained. Study objective also was to qualitatively detect alcohol in vitreous humor and corroborate with chemical analysis report of other body fluids and viscera.

About 27% of our total autopsy cases were due to road traffic accidents showed that people in this rural part of Southern Odisha lack awareness of traffic safety rules and poor conditions of road lead to increased fatalities. Our study revealed, 86% of males with 23.6% in 31-40 years quite similar to the study done at Maharastra where the highest numbers of deaths (39.79%) were recorded in the 20-39 years age group with male to female ratio of 3.08:1 [4]. The middle aged men were more vulnerable to accidents because they engage in more outdoor activities and were earning members in their family. In our study, pedestrians comprised of 51.6% of victims owing to fact that the proximity of villages to national highway increased their chances of meeting with a fatal accidents. Our findings showed that fatal head injuries in 42% of cases slightly higher to study at Maharastra where 32.44% of injuries were found on the head, neck and face [4].

Our study revealed that 20% tested positive for alcohol comparable to the study done in Norway where it was found out that in drivers, alcohol was the most common substance abuse followed by amphetamine. In 21.9% of the injured drivers, most commonly alcohol (11.5%) and stimulants eg. cocaine or amphetamines (9.4%) were found [5].

In a study done at Japan of determining the ethanol levels after consumption preceding death revealed the ethanol level in cardiac blood was more than vitreous humor and urine at 10 min(early absorption stage), the vitreous humor alcohol level was more than cardiac blood and urine from 20 to 50min (late absorption stage), vitreous humor alcohol level more than urine and cardiac blood from 60 to 120 min (distribution phase)and urine more than vitreous humor at 180 min (excretion phase) [6]. Out of 50 victims showing presence of alcohol in vitreous humor, 13 were pedestrians and among drivers of 2/3 wheelers 71.43% showed positive test for alcohol owing to the fact that driving under the influence of alcohol leads to overconfidence and impaired coordination as proved in many studies.

In our study amongst 50 (100%) vitreous positive cases, alcohol was detected in in blood, urine and stomach samples in 60%, 40% and 20% cases respectively owing to the fact that the vitreous humor being a better sample for detection of alcohol. Vitreous alcohol was positive even after 12 hours of death in 6 cases (12%) proved the advantage of vitreous sample over other samples. Of all these body fluids vitreous humor is the only fluid which is unique and preferred because it is anatomically separated, resistant to putrefaction for a long time and most sterile [7].

Conclusion

The accidents can be prevented by increasing the awareness of the population and stringent traffic regulations, increasing condition of the roads and avoiding use of alcohol. Regular checks for alcohol at roads could significantly reduce the mortality and morbidity due to road traffic accidents. The limited study period, minimum lab facility and qualitative determination of alcohol were the limitations of the study. Quantitative tests are more reliable in establishing the effect of alcohol on accidents.

Ethical Clearance: yes

*Conflict of Interest***:** None

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The Study of Awareness of Medical Ethics among the Resident Doctors of Civil Hospital, Ahmedabad, Gujarat

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Abstract

Introduction: The number of malpractice suits against doctors is increasing in India. The medical professionals should be knowledgeable and aware of the issues and laws that govern patient care and follow the Code of Medical Ethics as laid down by the Medical Council of India. This is important as it will not only enable the highest professional standards in the practice of medicine but also help avoid legal problems. *Materials & Methods:* An anonymous self-administered structured questionnaire about knowledge of Medical ethic was devised, tested, & distributed for the cross-sectional survey to resident doctors of Civil Hospital, Ahmedabad, Gujarat, India. The study was aimed at assessing the awareness of medical laws and ethics among the resident doctors. Among the one hundred twenty five distributed questionnaires 115 were returned, out of which fifteen questionnaires were incompletely filled and were not included for study, so 100 participants questionnaires were considered for the present study and analysed. *Conclusion & Results:* The participants were aware of various issues related to medical laws and ethics like informed consent, medical negligence, consumer protection acts, dichotomy, patient autonomy, paternalism etc. & as majority of participants agreed on questions.The participants knew the values of medical laws and ethics in medical profession.

Keywords: Medical Ethics; Resident Doctor; Code of Conduct.

Introduction

Medical Profession is guided and regulated by various laws & ethical guidelines. Medical Ethics is described as moral principles (code of conduct), which should guide the members of medical profession in their dealings with the patients, their relatives, community, and with other colleagues in profession. Modern code of medical ethics is basically developed from several ethical principles put forth by noble men and organizations in medical profession from the historical period of medical practice such as Hippocratic oath, Declaration of Geneva and International Code of Medical Ethics, etc, in spite of all these guidelines, there are still a number of reported incidents of unethical behaviour of medical students, resident doctors and health practitioners with patients as well as colleagues [1,2,3]. The Indian Medical Council (Professional Conduct, Etiquette, and Ethics) Regulations,2002 is aimed at strengthening the ethical standards among registered medical practitioners in India.,

The medical profession is becoming more and more technology dependent and various economical and market forces are influencing the decision making of the doctors. The medical profession is considered to be a noble profession, doctors and hospitals are expected to provide medical treatment with all the knowledge and reasonable degree of skill & care and will not do anything to harm the patient in any manner either because of their negligence, carelessness, or reckless attitude of their staff.

The number of malpractice suits against doctors is increasing in India. The medical professionals should be knowledgeable and aware of the issues

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and laws that govern patient care and follow the Code of Medical Ethics as laid down by the Medical Council of India. This is important as it will not only enable the highest professional standards in the practice of medicine but also help avoid legal problems. To reduce these lawsuits, acquiring a balance in training in both technique and ethics at the stage of medical education might be necessary [4].

As mentioned above, if ensuring that medical students acquire a sense of ethics results in a decrease in medical lawsuits, then ethics education for medical students using legal precedents as subject matter might be the best option. Courses in medical ethics are becoming an integral part of the curricula for many medical schools in Europe. Establishing ethics education using legal precedents, which has already been achieved in Western countries, will be a very important issue in some Asian countries including india [5].

Various methodologies are adopted to enhance the up gradation of knowledge regarding Medical Ethics of trainee doctors. it has been found that ethics teaching has a profound influence on medical professionals' attitudes and decision making [6,7]. Moreover, some institutions have developed guidelines for ethics in clinical teaching and surgical residency programmes [8-10].

Across undergraduate and graduate medical education, there is a call for more substantive preparation for the ethical challenges encountered by medical students and residents during training and in future professional duties [11-15].

Several studies have shown that medical students and residents do not experience past and current approaches to medical ethics and professionalism as sufficient to help them address the challenges they face [16,17,18]. Residents in several studies have expressed a preference for clinically oriented ethics education to prepare them for the day-to-day ethical tasks encountered in their work duties [16,19].

The trainee period is a critical time for fostering ethical reasoning [20] Professional attitudes & ethics skills of physicians are shaped in part by lessons of medical training [21]. The resident doctors are trainee doctors working in tertiary care centre, they are first contact medical care providers to patients in hospitals.

During their training it is essential that they are exposed to various ethical issues related to medical profession. The study is conducted to assess the awareness of medical ethics among resident doctors of Civil Hospital, Ahmedabad, Gujarat, India.

Materials and Methods

Study Design and Participants

An anonymous self-administered structured questionnaire about knowledge of Medical ethic was devised, tested (after thorough review of literature and adapted from various studies previously conducted) [22,23] & distributed for the cross-sectional survey to resident doctors of Civil Hospital, Ahmedabad, Gujarat, India. The structured questionnaire about awareness of medical ethic were pilot-tested on 10 resident doctors, prior to distribution of the questionnaire. A pilot study was done with a select group of resident doctors who were asked to fill out the questionnaire and return with comments and criticism. Minor changes were made to the final questionnaire. The participation in this study was voluntary and informed written consent was taken from each participant.

The questionnaire consists of a range of statements designed (after a thorough review of the literature) to identify respondents' awareness about medical ethics, perceptions towards physician–patient ethics, physician–colleague relationships and disclosure of medical errors & common medical laws. The questionnaire included a full range of response options, designed to identify the resident doctors' awareness for medical ethics.

Among the one hundred twenty five distributed questionnaires 115 were returned, out of which fifteen questionnaires were incompletely filled and were not included for study, so 00 questionnaires were considered for the present study and analysed.

Observation and Discussion

The Hippocratic oath is still held sacred by physicians: to treat the ill to the best of one's ability, to preserve a patient's privacy, to teach the secrets of medicine to the next generation, and so on. The Nuremburg code, Helsinki code are the foundation of ethical codes in medical practices. When asked about the content of codes 58% of the respondents were aware of them.

The importance of ethical knowledge in medical profession, the option were (1) not at all (2) somewhat important (3) Very Important (4) Extremely Important. 60% respondents were of very important opinion while 40% were of extremely important. That shows the respondents are aware to the importance of ethical knowledge for medical profession.

Table 1:

Sr. No.	Statements	Agreed N (%)	Disagreed N (%)
1	Children should not be treated without consent of parents or guardian except in emergency	92	8
2	Ethical conduct is only important to avoid legal action	27	73
3	Medical practitioner should refer patients to get share of fees	3	97
4	If patients wish to die, should be assisted in doing so no matter what his/her illness	18	82
5	Patients should always be told if something is wrong	89	11
6	Confidentiality in medical practice cannot be kept in modern care &should be abandoned	74	26
7	Patients consent is needed only for operation not for investigation or treatment	10	90
8	During treatment patient's wish must be adhered to	71	29
9	Doctors should give the best possible treatment irrespective of the patient's opinion	70	30
10	Close relative must be told about patient's condition.	74	26
11	Doctors and nurse should refuse to treat patients who behave violently.	32	68
12	Doctors should not write the prescription in secret formula	92	8
13	Doctors are influenced by drug company inducement including gift.	33	67
14	A physician may run an open shop for dispensing drugs and appliances prescribed by other doctors.	31	69
15	In one's owns practice it is better to use the brand name than the generic name of drug.	12	88
16	Patient can approach the consumer court for compensation, if any medical procedure has gone.	68	32

Majority of the respondents knew the values of medical ethics in medical profession. None replied the ethical knowledge is not at all important in medical profession. In study conducted in by S.Hariharan et al. all the doctors agreed that knowledge of ethics is important to their work [25]. In other studies majority of medical students (64-68%) believe that ethical practice are critically important in the provision of highest standard of medical care [24,25].

27% of respondents were of the opinion of following ethical principles in their profession will avoid them from facing legal issues which is higher when compared to the study done by Mohammed et al [26] in the state of Egypt where only 4.7% thought so.

71% of the respondents said they would always adhere to the patient's wishes during the course of treatment, these findings are comparable to the study done by Seetharam etal [27] where 65.1%, Mohammed et al [26] where 57.8% &. Adhikari [28] et al where 66.9% of the respondents were of the same opinion.

In our study 70% said that irrespective of the patients opinion doctor should give the best possible treatment to the patients, where the study by Adhikari [28] et al 60.2% were agreed to this 89% of respondents were of the opinion that patients should always be told if something is wrong when compared to study done by Walrond et [26] et al showed 74.5% of respondents strongly agreed to this.

Consent is important in ethical practices. Only 10% of respondents were agreed that Patients consent is needed only for operation not for investigation or treatment with comparison to study Singh, et al [29] where 20.5% of senior resident were of agreed to this.

72% agreed that close relative must be told about patient's condition where as 82.9% agreed to it in a study by Akoijam Brogen [30] et al & 77.1% agreed to this in study by adhikari [28] et al .

92% of respondents agreed that Children should not be treated without consent of parents or guardian except in emergency with comparison to study by Singh et al [29] where 86.3% & Adhikari et al [28]. where 85% of respondents agreed to this.

Patient has a right of access to health care. The healthcare worker should take reasonably practicable steps to maintain a safe environment for patients and staff in which patients can be offered treatment in accordance with the duty of care that is owed to them [31] 68% of respondents were disagreed that Doctors and nurse should refuse to treat patients who behave violently, in compare to study by Akoijam Brogen [30] et al, 71.3% of junior doctors disagreed to it.

Dr. Hebert [32] acknowledges that interactions with pharmaceutical representatives can give rise to conflicts of interests by influencing a physician's prescription practices, he also describes many examples of professional boundary transgressions, which range from accepting gifts from patients to having sexual relations with patients. These real-life cases serve to remind healthcare professionals of the importance of maintaining a therapeutic and professional relationship with their patients.

The current crisis in health care and the resulting evidence of large-scale malpractice, such as unnecessary surgery and laboratory investigations, glamour-based (as against necessary) medicine, the 'cut' practice, and quackery etc; the practitioners and medical institutions play on gullible patients [33].

Getting share of fees by referring patients (dichotomy) is unethical practice,97% respondents were against this practices as compared to the study by Seetharam et al [27] 80% of respondents are against and 80.2% were against this type of practice in a study [34] carried out by Bhardwaj et al.

33% of respondents were agreed that doctors are influenced by drug company inducements including gift where as in comparison with a study by Adhikari [28] where higher percentage 80.5 % of respondents were agreed to it while study by Bhardwaj [34] et al al 30.4% respondent agreed to it

A basic knowledge of how medical negligence is adjudicated in the various judicial courts of India will help a doctor to practice his profession without undue worry about facing litigation for alleged medical negligence [35].

In a question to Medical negligence comes under with 49% of respondents replied as criminal, 5% civil, 12% consumer protection, 34% all of them in comparison to study carried out in Vadodara [36] where 30.49% of respondents resident doctors replied as criminal, 21.95% civil, 18.29.% consumer protection and 29.27% all of them.

The question to a physician may run an open shop for dispensing drugs and appliances prescribed by other doctors, 69% of respondent disagreed with it. 88% of the respondent disagreed to the statement that In one's owns practice it is better to use the brand name than the generic name of drug. Majority of the resident doctors (89.%) in present study said they would inform the patient about anything is wrong, Our findings were higher when compared to the study done by Seetharam et al [27] (16.6%), Biswath Chatterjee et al [37] in state of West Bengal (72.9%) and Mohammed et al [26] (83.6%).

In a question regarding the patients wish to die, should be assisted in doing so no matter what his/her illness, 82% of the respondents were disagreed in a study by walrond er et [23] al.,78% of the respondents are strongly disagreed with it.

About the source of knowledge for learning ethics, 42% of respondents were relied on the books on ethics, 15% on ethics journals, 25% on media including Newspapers, TV, Internet, social media., 10% on clinical training, 3% on conference. In a study carried out by Biswath Chatterjee et al [40] in 2009 on undergraduate medical students in West Bengal 47.8% of respondents replied the source of knowledge as books on ethics.

Summary and Conclusions

The study was aimed at assessing the awareness of medical laws and ethics among the resident doctors. The participants were aware of various issues related to medical laws and ethics like informed consent, medical negligence, consumer protection acts, dichotomy, patient autonomy, paternalism etc. & as majority of participants agreed on questions.The participants knew the values of medical laws and ethics in medical profession

The medical profession is sometimes being criticized from all sections of society due to unethical practices & over consumerism. Medical ethics are more or less self imposing codes of conduct among the doctors. The Medical council of India has laid down professional ethical codes of conducts but it failed to ensure strict ethical standards among doctors. The medical students are taught the medial laws and ethics in the subject of Forensic Medicine but there is no any formal training in practice of medical ethics during residency for the postgraduate trainee doctors. The postgraduate trainee doctors will be benefitted from getting the exposure of the medico-legal process and the its consequences. During residency, thorough literature review of ethical negligence cases should be considered compulsory and medical law cases with possible legal implications should be discussed as a part of their training. There should be regular integrated seminars, CME's workshops, conferences for the resident doctors to enhance their skills related to medical laws and ethical issues. The curriculum for teaching of resident doctors needs to be more detailed in regard to medical laws and ethical issues.

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Original Article

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Assessing Knowledge, Skill and Attitude of Medical Professionals with Relevance to Medical Certificate of Cause of Death

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Abstract

In the study, evaluation of information for completion of non medical variables of Medical Certificate of Cause of Death (MCCD) like deceased's name, age, sex, date and time of death, doctor's signature and date of verification etc. filled in mock death certificates was done. We also studied and assessed the awareness, skill, attitude and knowledge amongst medical professionals (MPs) in documenting MCCD completely and accurately. Name, sex and age of the deceased were correctly and completely mentioned by 77.21%, 90.48% and 89.12% physicians respectively. Exact date and time of death was reported by 87.07% and 88.10% doctors respectively. Doctor's signature column was filled by 75.51% physicians while date of verification was mentioned by only 63.95% doctors. This study reflects inadequate knowledge, practice, training and lack of awareness about importance of MCCD; carelessness and negligence on the part of certifying doctors.

Keywords: MCCD; WHO; Death Certificate; Awareness; Attitude; Medical Professionals.

Introduction

Death is an inevitable event in every person's life. However, structure of the modern society has necessitated death to be authenticated by the medical professional. Therefore the medical professional has to bear and carry out this responsibility with all fairness and pragmatism. Issuing a certificate of death is one of the onerous duties of a medical professional, which may have medico-legal implications [1].

Medical Certificate of Cause of Death [MCCD] scheme was proposed by World Health Organization (WHO) as an imperative tool to obtain scientific and reliable information in terms of causes of mortality. It was accepted by the Government of India with suitable incorporations made in the Registration of Births and Deaths Act, 1969 [2]. MCCD under Civil Registration System, in India, has statutory backing under sections 10 (2) and 10 (3) of the Registration of Births and Deaths Act, 1969. According to this scheme, a medical person attending the deceased in his/her last illness, after death of a person shall fill in form no. 4 for institutional deaths and form no. 4A for non-institutional deaths [3].

Every medical professional is obligated to issue MCCD in the unfortunate event of death of his patient. Incomplete or inaccurate entries in these certificates pose difficulties in obtaining reliable information pertaining to causes of mortality. Routine mortality statistics including age, sex and cause of death, are extracted from death certificates using WHO guidelines [4]. The purpose is to permit systematic recording, analysis, interpretation and comparison of morbidity and mortality data collected in different countries or areas at different times [5].

Death Certificate is believed to be very poor and inaccurate in most of the health institutions in India [6]. Unfortunately, errors in death certificate are common [7,8,9] and range from incomplete certificates and illegible handwriting to inaccurate causes and manners of death [7,8,10]. Also seen is

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the use of medical abbreviations [8] rendering the certificate unintelligible to the general public.

MCCD issued in Form 4/4A consists of two sections i.e. medical part and nonmedical part. In nonmedical part, the certifying doctor has to fill the details of identification data of the deceased like Name, Sex, and Age etc. Also it is mandatory to fill the date and time of the event i.e. death accurately. After completion of the Part I and Part II (medical part) the certifying doctor is supposed to fill the columns like doctor's signature with name and date of verification [2,3].

Considering these background the authors felt the need and have made a sincere attempt to contribute a little more with an aim to study/assess the awareness, attitude and knowledge amongst MPs in documenting MCCD completely and accurately. We also evaluated information for completion like name, age, sex, date and time of death, Doctor's signature and date of verification filled in mock death certificates.

Methodology

The present prospective cross-sectional survey based study was conducted amongst the MPs working in a tertiary health care teaching hospital in Maharashtra. Prior approval of Institutional Ethics Committee was obtained to conduct the study and doctors in various departments were approached to participate in the study with their written informed consent. 294 MPs participated in the survey. A standardized questionnaire and MCCD form along with a mock patient data (Case scenario 1) was given to the MPs participating in the survey. They were asked to write most appropriate answer to the questionnaire and fill up the mock MCCD form. Percentage of correct response was calculated and the results were tabulated and analyzed using Epi_info 7 software.

Case scenario 1 (Mock patient data for filling MCCD form): Ratan Ramesh Raykar, a 60 years old resident of Mahesh Nagar, Pimpri, Pune, was suffering from Bronchial Asthma since 15 years, Diabetes Mellitus since 10 years and Ischaemic Heart Disease since 2 years. He was admitted in ICU of Dr. D. Y. Patil Medical College & Hospital on 11/12/2013 at 7 am with complains of severe chest pain radiating to left shoulder and sweating since 6 am. He also had vomiting once. ECG revealed T-wave inversion and ST-segment elevation suggestive of Myocardial infarction. On 12/12/2013 morning his condition deteriorated, landed into cardio-respiratory arrest and died at 8 am. Issue a Medical Certificate of Cause of Death in the prescribed format.

Results

Name being the major identification factor of a person (deceased) was completely written by 77.21% physicians whereas 22.11% were ignorant/ overlooked in writing the name. However 2 physicians wrote it incompletely by using initials. Gender information literally makes it easier to classify the diseases and find out the influence of gender over these diseases and further mortality statistics. It was written completely by 90.48% physicians, 8.16% of them left it blank while 1.36% used abbreviations as either M or F. It is a known fact that many diseases manifest as the age advances and extremes of ages are more vulnerable to many diseases, hence it becomes very important to state the accurate age of the person/deceased in MCCD form. 89.12% physicians mentioned the age correctly, 8.16% of them left it blank and 2.72% mentioned the age incorrectly.

Exact date of death was mentioned correctly and completely by 87.07% physicians, 1.70% of them left this column blank and 11.22% physicians wrote it incorrectly or incompletely. Time of death plays a vital role in indicating the severity of the disease from time of onset of symptoms. It was written correctly by

Table 1: Completeness found in MCCD

Sr. No.	Non medical variables of MCCD	Completeness Found in Mock MCCD forms					
		Correct/Complete response		Incorrect/Incomplete response		No Response	
		No.	Percentage	No.	Percentage	No.	Percentage
1.	Name of the deceased	227	77.21	2	0.68	65	22.11
2.	Sex of the deceased	266	90.48	4	1.36	24	8.16
3.	Age of the deceased	262	89.12	8	2.72	24	8.16
4.	Date of death	256	87.07	33	11.22	5	1.70
5.	Time of death	259	88.10	30	10.20	5	1.70
6.	Doctor's signature	222	75.51	--	--	72	24.49
7.	Date of verification	188	63.95	--	--	106	36.05

88.10% doctors, incorrectly by 10.20% while 1.70% of them did not mention the time.

75.51% physicians signed in the doctor's signature column, at the same time, as many as 24.49% of them were ignorant in putting their signature. Date of verification was written correctly by 63.95% physicians and 36.05% of them left it blank. (Table 1)

In the second part of the study knowledge and awareness of doctors regarding MCCD was assessed by giving them questions related to MCCD. The first question was regarding use of standard form in case of death at home which was answered correctly by 24.83% doctors, 20.75% of them were incorrect and 54.42% physicians marked this column as do not know.

In response to the question regarding standard form to be filled in case of hospital death, it was answered correctly by 26.19% doctors, incorrectly by 24.49% and 49.32% physicians did not know the answer to this question.

Whether a physician can charge fee for issuing MCCD; was correctly answered by 58.16% physicians, 19.73% of them were incorrect and 22.11% physicians marked this column as do not know.

Question related to refusal or delayed issue of MCCD was correctly answered by 70.41% doctors, incorrectly by 5.44% whereas 24.15% did not know the answer.

The cause of death is recorded as per the sequence adopted by WHO. 50% physicians answered this question correctly, 15.99% were wrong and 34.01% of them did not know the answer. (Table 2).

Table 2: Knowledge and awareness regarding MCCD

Sr. No	Question	Correct response		Incorrect response		Do not know	
		No.	Percentage	No.	Percentage	No.	Percentage
1	If patient dies at Home, MCCD is issued in which form?	73	24.83	61	20.75	160	54.42
2	If patient dies at Hospital, MCCD is issued in which form?	77	26.19	72	24.49	145	49.32
3	Can Medical Professional charge fees for preparing & issuing MCCD?	171	58.16	58	19.73	65	22.11
4	Can Medical Professional refuse or delay issuing of MCCD if he / she have not received professional fees for treating patient before death?	207	70.41	16	5.44	71	24.15
5	In MCCD, the cause of death is recorded as per the sequence adopted by which body?	147	50.00	47	15.99	100	34.01

Discussion

In the present study variables related to identification were filled out correctly in 77-90% of the death certificates. Agarwal et al. revealed that such preliminary components of the certificate viz. full name, age, sex, address were correctly entered in all the cases [11]. Shah VR and Bala DV reported that these variables of identification information were filled correctly in 95-100% MCCDs [12]. While El-Nour et al. reported these variables to be filled in correctly in 92.8% certificates [13]. In a study [14] out of 353 death certificates (DC) studied, 3 DCs were written without mention of sex of the deceased. Age of the deceased was not written by certifier in 9 DCs while in 9% DCs identity/name was not mentioned correctly or completely.

Ganasva AS et al. reported completeness in terms of filling up of name and age was 95.1% and 91.2% respectively, while gender was mentioned in 54.3% of the forms. Date and time of death was mentioned in almost all the forms [15]. In this study the information on age and sex was missing in 8.16% and 8.16% of the death certificates, respectively. Our findings are similar to the findings of Gupta et al. who reported that information of age and sex was missing in 5.35% and 8.7% of the death certificates respectively [16]. Our finding is consistent with the study by Maudsley G, William EM who stated that the major factors deficient in death certification is lack of 'routinized orientation' and proper attitude of the certifier i.e. the doctor [9]. This may be due to 'doctor being in a hurry' or 'lazy attitude of doctor' or may have overlooked this section. This picture points towards 'attitude' of certifier. Other investigators have also derived similar results [17]. Although there is a need to change this mindset, it cannot be done by a single individual.

The doctor certifying death is required to put his signature, mention his/her full name & designation along with date and preferably should use his/her seal bearing registration number, at the bottom of the certificate. In the present study forms were completed

with signature of the doctor in almost 75.51% while date of verification was present in 63.95% forms. In earlier study all the certificates bear signature but only 10 (3%) certificates had the seal with registration number of the physician [11]. In Ganasva's study the forms were completed with name and signature in almost 99.5% while date of verification was present in only 34% [15]. El Nour et al. had observed 18% of certificates were not signed by doctors, while in 82% of the death certificates signature of doctors was present [13]. In Beirut, almost 50% of certificates did not contain signature of certifier. [18] 15% of error was omission of doctor's name and signature at the end of the DC [14]. Swift B and West K of Dept. of Histopathology from UK observed 10% of certificates were of very poor standard, illogical & inappropriately completed [19] which are consistent with the findings of present study.

Ganasva et al. revealed that 21(1.1%) MCCDs were found completely filled, but on lowering the criteria of completeness to a condition (slightly incomplete) where less than 15% columns were left blank; such slightly incomplete data was found in only 4 (0.2%) MCCDs. Most of MCCD forms i.e. 96.19% were found notably incomplete and 45 (2.3%) MCCD forms were grossly incomplete. They reported that all the participants felt that there was lack of supervision of their work by higher authority. Majority of them (68.8%) felt that they were overburdened due to lack of sufficient staff. [15]

Many doctors qualify with little or no formal training in death certification, whereas others may be inexperienced or have had insufficient practice. This might be the reason for incompleteness/ incorrectness in death certificates. Other reasons may be that doctors had lack of understanding regarding importance of Medical Certificate of Cause of Death in mortality statistics for epidemiology, public health policy and research; or carelessness and reluctance/ ignorance on their part to fill in such forms.

Conclusion

This study highlighted on the easily avoidable errors in terms of name, age, gender etc. of the deceased, date and time of death and name and signature of the attending physician in all death certificates. It reflects inadequate practice, training and lack of awareness about importance of MCCD, carelessness and negligence on the part of certifying doctors. More attention has to be devoted to raising physicians' awareness in completing death certificates accurately and completely. They should be made aware that MCCD is a fundamental requirement for building up epidemiological data. Recurring educational sessions, practical training on the case to case basis at regular intervals, periodic auditing of death certificates and feedback are necessary to increase the accuracy of this important document.

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Socio-Demographic Profile of Head Injury Victims Died in Two Wheeler Accidents: An Autopsy Based Study

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Abstract

Introduction: The development of science in various aspects of human life has evolved far more superior, sophisticated and lethal weapon of assault. The motorized transportation media like vehicles, trains, aero planes etc. with fast moving vehicular traffic, vast urbanization and changing social patterns have contributed to increase in the incidence of trauma to human body. In spite of all the advantages that motorcycles have, motorcyclists form a large proportion of those injured or killed on the roads. Socio-demographic factors play important role in deciding standard of living and safety measures available for any population group. Present study was carried out to find relation between various socio-demographic factors in head injury victims died in two wheeler accidents which will be helpful for implementation of preventive measures. *Material and Methods:* The present autopsy based study was conducted over a period of two years from 1st Oct 2012 to 30th Sept 2014 in the Department of Forensic Medicine and Toxicology, Government Medical College Latur, Maharashtra, India. All autopsy cases of head injury involved in two wheeler accidents were included in the study. Detailed history was taken and post-mortem examination was carried out. Head injury victims died in two wheeler accidents during study period selected and studied for its relation with various socio-demographic factors. *Results:* Out of total 1706 autopsies conducted by the department during study period, 95 (05.57%) cases were of death due to head injury in two wheeler accidents. Out of total 95 cases, maximum deaths i.e. 55 (47.37%) occurred between 21-40 years of age group and 78 (82.1%) were males. Married victims were 73 (76.84%). Maximum victims i.e. 89 (93.68%) were literate and most of the victims i.e. 67 (70.53%) died due to accidents occurred in urban area. Victims from lower socio-economic group were commonly involved. Not a single rider/pillion had worn helmet at the time of incidence. *Conclusion:* Legal code alone is unlikely to be effective in changing motorcyclist's behaviour. There is an urgent need of public education and awareness about safety measures to be followed while driving. Guiding and implementing traffic related rules through counselling, health education, road shows, use of electronic and print media etc will have a great effect in controlling these accidents. Strict obedience of traffic rules can save the life of most of the victims.

Keywords: Socio-Demographic Profile; Two Wheeler; Accidents; Head Injury.

Introduction

Accidents are world's most serious health problem. The development of science in various aspects of human life has evolved far more superior, sophisticated and lethal weapon of assault. The motorized transportation media like vehicles, trains, aero planes, etc with fast moving vehicular traffic, vast urbanization and changing social patterns have contributed to increase in the incidence of trauma to human body [1].

According to World Health Organization road traffic injuries are increasing, notably in low and middle-income countries, where rates are twice those in high-income countries [2]. With a rising income and greater need for mobility, the personalized mode of transport was growing in importance in the past few years. Motorcycles have increasingly become a popular means of transport in low and middle-income countries [3]. This is partly because

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motorcycles are relatively cheaper than other motor vehicles in terms of initial purchase and maintenance costs [4]. In spite of all the advantages that motorcycles have, motorcyclists form a large proportion of those injured or killed on the roads [3]. In India and few other developing countries the penetration level of two wheelers (two wheelers/1000 persons) is much higher compared to developed countries [5].

Present study was carried out to find relation between various socio-demographic factors in head injury victims died in two wheeler accidents which will be helpful for implementation of preventive measures.

Material and Methods

This prospective autopsy based study was conducted over a period of two years from 1st Oct 2012 to 30th Sept 2014 in the Department of Forensic Medicine and Toxicology, Government Medical College Latur, Maharashtra, India.

All autopsy cases of head injury involved in two wheeler accidents were included in the study. Detailed history was taken from police, relatives and eye witnesses and post-mortem examination was carried out. Head injury victims died in two wheeler accidents during study period selected and studied for its relation with various socio-demographic factors.

Results

During the study period total 1706 medico-legal autopsies were conducted by the department of which 448 (26.26%) cases were of RTA (Road Traffic Accidents). Out of 1706 autopsies, 95 (5.57%) cases turned out to be of head injury victims died in two wheeler accidents.

Table 1: Age, Sex and Marital status (n=95)

Demographic Data	No. of Cases (%)
Age Groups (yrs)	
0-10	00 (0%)
11-20	05(5.26%)
21-30	27(28.42%)
31-40	28(29.47%)
41-50	16(16.84%)
51-60	09(9.47%)
61-70	07(7.37%)
>70	03(3.16%)
Sex	
Male	78(82.1%)
Female	17(17.9%)
Marital Status	
Married	73 (76.84%)
Unmarried	22 (23.16%)

Table 2: Literacy Level (n=95)

Literacy Level	No. of Cases	Percentage (%)
Illiterate	06	06.32%
Primary School	13	13.68%
Middle School	10	10.53%
High School	18	18.95%
Diploma / Intermediate	09	09.47%
Graduate / Postgraduate	36	37.90%
Professionals	03	03.16%

Table 3: Place of accident. (n=95)

Place of Accident	No. of Cases	Percentage (%)
Rural	28	29.47%
Urban	67	70.53%

Table 4: Socio-economic Group (n=95)

Socioeconomic Group	No. of Cases	Percentage (%)
Upper	08	08.42
Middle	29	30.53
Lower	34	35.79
Dependent	24	25.26

In the present study (Table 1), it was observed that out of total 95 cases, maximum deaths i.e. 55 (47.37%) occurred between 21-40 years of age group and 78 (82.1%) were males. Married victims were 73 (76.84%).

In the present study, it was found that out of total 95 cases maximum victims i.e. 89 (93.68%) were literate (Table 2) and 67 (70.53%) victims died due to accidents occurred in urban area (Table 3).

In the present study, it was observed that out of total 95 cases, victims from lower socio-economic group were commonly involved (Table 4).

In the present study, it was also observed that most of the deaths occurred during day time 56 (58.97%). Incidence of two wheeler accidental deaths was nearly same in all the three seasons i.e. 33 (34.74%) in summer & 31 (32.63%) in both rainy & winter season.

Out of total deaths i.e. 95, maximum deaths i.e. 70 (73.68%) occurred due to involvement of geared vehicles & 25 (26.32%) deaths occurred due to involvement of non-geared vehicles. Not a single rider/pillion had worn helmet at the time of incidence.

Discussion

Road Traffic Injuries (RTIs) are the sixth leading cause of death in India with a greater share of deaths, disabilities and socioeconomic losses in young populations. The growth of the motor vehicle industry, liberalized economic policies of successive governments, aggressive media promotion, increasing purchasing power of Indian people, easy availability of loans and poor public transport systems have contributed to increasing motorization and a changing transportation scenario in India. The total number of registered vehicles increased by 14 times from 5.3 million in 1981 to 72.8 million by 2004. The number of public transport buses has increased slightly from 331 000 in 1991 to 768 000 by 2004, while during the same period, motorized two wheelers (MTWs– scooters, motorcycles and mopeds) increased 4 times from 14 million to 52 million. Overall, 71% of all vehicles are MTWs, 12% are cars, jeeps and taxis, 1% buses and the remaining are other vehicles. MTWs account for a large proportion of vehicles on the roads [6]. Motorcycles have much higher risks of being involved in crashes involving fatalities than other vehicles. Socio-demographic factors play important role in deciding standard of living and safety measures available for any population group. However despite the gravity of the situation, there are very few studies dedicated to motorized two wheeler accidents.

During study period total 1706 medico-legal autopsies were conducted of which 448 (26.26%) cases were of RTAs. Out of 1706 autopsies, 95 (5.57%) cases turned out to be of head injury victims died in two wheeler accidents. Sharma BR et al (7.04%) [7], Behera C et al (4.01%) [8], Jha S et al (4.75%) [9], Surendar J and Shiva RD (5.64%) [10] and Reddy A et al (4.42%) [11] observed similar burden of deaths due to head injury in RTAs involving two wheelers.

In the present study (Table 1), maximum deaths were observed between age group 31-40 years (29.47%) followed by 21-30 years (28.42%). This shows that maximum deaths i.e. 55 (47.37%) were between 21-40 years. This finding is consistent with Sharma BR et al (53.79%) [7], Behera C et al (72.34%) [8], Jha S et al (38.33%) [9], Surendar J and Shiva RD (61.36%) [10] and Reddy A et al (45.18%) [11] Contrary to present study findings Sirathanout J and Kasantikul V [12] observed maximum deaths below 21 years of age group. Out of total 95 cases, maximum were males i.e. 78 (82.10%). Similar finding was observed in the most of other studies.

The young adult males are the prime bread earners of the family who remains outdoors during most of the day and have a tendency to take undue work so they are more commonly exposed to outdoor activities travelling between the home and place of work whereas old age peoples and women usually remain indoors and children are confined to the residential premises.

In the present study (Table 2), it was observed that most of the victims were literate i.e. 89 (93.68%) while 6 (6.32%) were illiterate. Graduates and postgraduates were maximum i.e. 36(37.90%). This study finding is in consistence with Jha S et al (74%)

[9] and Radha PK et al (82.5%) [13] where most of the victims were literate. This may be due to unawareness about traffic rules & inadequate use of safety measures even by the literate people and may be due to non stringent action by the government for violation of traffic rules.

In the present study (Table 3), it was observed that 67 (70.53%) victims died due to accidents occurred in urban area and 28 (29.47%) occurred in rural area. Present study finding is in consistent with Radha PK et al (80%) [13], Ravikumar R (74.29%) [14] and Kumar S and Singh RKP (72%) [15]. Industrialization, urbanization and changing life style of people has created heavy traffic burden in urban area which results in disproportion in traffic density and safety measures provided which results in more accidents & deaths.

In the present study (Table 4), it was observed that out of total 95 cases, victims from lower socio-economic group i.e. 34 (35.79%) were commonly involved followed by middle socio-economic group i.e. 29 (30.53%). This may be due to economic problems faced by the lower socio-economic group people compromising safety measures & treatment.

It was also observed that most of the deaths i.e. 56 (58.97%) occurred during day time. Similar finding is observed by Behera C et al (55.32%) [8], Reddy A et al (70%) [11], Sirathanout J and Kasantikul V [12], Ding SL et al [16] and Kakeri SR et al (68.1%) [17] . This may be probably due to heavy and congested traffic during day time while reaching to destination.

Incidence of two wheeler accidental deaths was nearly same in all the three seasons i.e. 33 (34.74%) in summer & 31 (32.63%) in both rainy & winter season in the present study. This is consistent with Reddy A et al [11] and Kumar S and Singh RKP [15]. Whereas Jha S et al [9]and Honnungar RS et al [18] observed more fatal accidents during summer season and rainy season respectively in their study. There is no direct relation found between season & two wheeler accidents. It is mostly dependant on road condition, safety measures & driving skills rather than seasonal variations.

Out of total deaths i.e. 95, maximum deaths i.e. 70 (73.68%) occurred due to involvement of geared vehicles & 25 (26.32%) deaths occurred due to involvement of non-geared vehicles. Reddy A et al (80%) [11] and Fitzharris M et al (56.1%) [19] also found maximum deaths due to involvement of geared vehicles in their study. This may be due to better control and easy handling of non-geared vehicles as compared to geared one. Also the geared vehicles are more in weight and can attain high speed compared to non-geared vehicles. Mass and velocity increases kinetic energy which in turn causes more damage at the time of accident.

In the present study, not a single rider/pillion had worn helmet at the time of incidence. In other similar studies maximum riders/pillions had not worn the helmet at the time of accident. Simply use of helmet as a safety measure could have been saved most of the lives.

Conclusions

Middle aged males of low socioeconomic group being most accident prone who was perhaps the bread earner of his family. Majority of the cases occurred during daylight which indicates faulty traffic management system where traffic rules are always over looked and poor sense of safe driving methods among victims (e.g. use of helmet). These accidents are responsible for loss of life, disability and undefined impact on socioeconomic resources (due to loss of productive population). It can be preventable. Legal code alone is unlikely to be effective in changing motorcyclist's behaviour. There is an urgent need of public education and awareness about safety measures to be followed while driving. Guiding and implementing traffic related rules through counselling, health education, road shows, use of electronic and print media etc., will have a great effect in controlling these accidents.

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Chloral Hydrate Poisoning with Analytical aspects and its Management

Mohit Gupta[1], Abhishek Yadav[2]

Abstract

Chloral hydrate has been used by criminals, doctors and in various other industries. The interest in this drug has been rekindled since it is now popularly being used as Date rape drug. Also recent studies have shown increased health risks with commercial use of chloral hydrate. This paper has been written with the aim of highlighting the analytical aspects and management of Chloral hydrate poisoning.

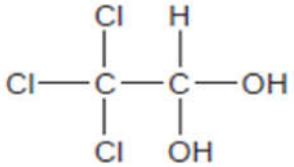
Keywords: Chloral Hydrate; Poisoning; Analysis; Management.

Introduction

Chloral hydrate (a.k.a. Dry wine, Noctec, Knockout drops; Mickey finn, Choral, Hydrated choral, Chloralex, Chloralvan, Novochlorhydrate, Chloraldural, Chloraldurat, Trichloralacetaldehyde hydrated, Trichloroethylidene glycol, 2,2,2-Trichlorethane-1,1-diol) is a colorless, crystalline substance with a pungent pear like odor and bitter taste. It was first synthesized in 1832 by Justus von Liebig [1] and first used as a sedative and hypnotic in 1869. It is often used as a recreational drug. Its structure is similar to that of ethyl alcohol. It is also a drug of abuse.

Chemical Formula: CCl3CH2

Chemical Structure



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Sources [2-5]

1. Formulations marketed include gargles, lotions or solutions used as mouth bath (owing to CH analgesic and disinfectant properties).
2. Syrups prescribed as sedatives in elderly .
3. Available as rectal suppositories.
4. Short term sedation in children during non painful procedures (CT scan).
5. Treatment of alcoholism and strychnine poisoning.
6. Psychiatric hospital.
7. Mickey finn – a combination of chloral with alcohol or with croton oil.
8. Knock out drops.
9. Metal cleaning and degreasing operations.

Exposure

TCE has been detected in air, water, soil, food, and animal tissues. The most heavily exposed people are those working in the degreasing of metals, mainly through inhalation of vapor. In united states the maximum contaminant level of groundwater is 5 μg/L [6].

Pharmacokinetics

Mechanism of Action

Chloral hydrate is a central nervous system (CNS) depressant. It has also been classified as a Stupefying agent. The initial depressant effect is due to Chloral hydrate, but prolonged CNS depression is primarily

due to trichloroethanol. The detailed mechanism by which chloral hydrate and trichloroethanol depress CNS is not completely known.

Metabolism

Chloral hydrate is well absorbed from the gastrointestinal tract, producing pharmacological action within 30 min. It is rapidly metabolized to trichloroethanol by alcohol dehydrogenase, which is pharmacologically active. A small amount is metabolized to an inactive metabolite, trichloroacetic acid. Trichloroethanol is either conjugated with glucuronic acid to form urochloralic acid or oxidized by aldehyde dehydrogenase to trichloroacetic acid. It is excreted in urine as trichloroacetic acid and urochloralic acid.

Half Life: Chloral hydrate - few minutes, Trichloroethanol - 4 to 14 h.

Exposure Limit: According to US Environmental Protection Agency (EPA) regulations, up to 1999, the maximum contaminant level and the maximum contaminant level goal for trichloro acetaldehyde, was 60 and 40 mg/ l, respectively [7].

Fatal Dose: 5-10 g. Acute ingestion of 2 g is likely to lead to toxic symptoms

Fatal Period: 8–12 h.

Normal reference values - Therapeutic oral dose in adults >0.5-2gm.

Signs and Symptoms of Chloral Hydrate Poisoning (Table 1).

Table 1: Signs and symptoms of chloral hydrate poisoning

	Features
Acute poisoning	• GI tract: nausea, vomiting, retrosternal burning sensation, hemorrhagic gastritis, stomach or intestinal perforation, esophageal stricture formation. • General – Odor *(Acrid pears like)*, pupils – initially miotic and then dilate, hypothermia • Skin: Scartinal or urticarial rash • CNS – ataxia and lethargy, deep coma within couple of hours. • CVS – Atrial fibrillation, supraventricula tachycardia, ventricular arrhythmias, torsades de pointes, Ventricular fibrillation, asystole and hypotension. • Hepatorenal – renal and hepatic failure The combination of deep coma and dysrhythmias without hypoxia is typical of chloral hydrate poisoning.
Chronic poisoning	• Skin – erythematous and urticarial eruptions • GIT – irritation • CNS – Convulsions, tremors • Respiratory system – dyspnea • Liver damage • Delirium tremens, seizures, psychosis may be seen • Certain studies have shown increased incidence of carcinomas in mice. [4]

Biomarkers [8]

A biomarker can be broadly defined as any biological index capable of being measured that is associated with or indicative of a defined biological endpoint such as a developmental or disease stage. Typically, biomarkers are defined as quantitative measures of changes in the biological systems that respond to either (or both) exposure and/or doses of xenobiotic substances that lead to biological effects.

The malondialdehyde-modified DNA adduct, 3-(2-deoxy-$-D-erythro-pentofuranosyl) pyrimido[1,2"] purin- 10(3H)-one (MDA-MG-1), is formed from the metabolism of 1 mM chloral hydrate, trichloroacetic acid, and trichloroethanol by control B6C3F1 mouse liver microsomes, mouse pyrazole-induced microsomes, male F344/N rat liver microsomes, and human liver microsomes in the presence and absence of calf thymus DNA . MDA-MG-1 is persistent in the mouse liver, having a t½ of 12.5 days [9] therefore, it could serve as a biomarker for the study of xenobiotic-induced and naturally formed lipid peroxidation and endogenous DNA adduct formation [10]. Biomarkers for metabolites of TCE in animal models include a chloral-protein adduct which has been detected in tissues of TCE-treated mice [11].

One study revealed a time- and concentration-dependent release of LDH after normal human epidermal keratinocyte cells were exposed to different doses of TCE [8].

A significant decrease in total epididymal sperm count, sperm motility, specific activities of enzymes glucose 6-phospho dehydrogenase, and 17 α-hydroxy steroid dehydrogenase with a concomitant

decrease in serum testosterone concentrations in TCE-inhaled rats was recorded by Kumar et al[12]. High and long-term exposure of TCE to persons results in an increase in the level of á1-microglobulin excretion, which is a potential biomarker of renal toxicity[13]. The specific content of CYP3A in liver microsomes was found to be increased more than 2-fold by the administration of TCE [14].

No plant based biomarker for chloral hydrate or TCE has been found in literature.

Analytical Aspects and Management

A. *Colour Tests*[15]: Fujiwara test - 3 to 5 cc. of concentrated (17 to 25 per cent) NaOH solution in a test-tube are superimposed with a layer 2 mm. thick of pyridine. A small quantity of the substance or a drop of the solution to be tested is added and the contents of the tube are raised to the boiling point, shaking well to avoid bumping. If the color has not appeared when the mixture has boiled a few seconds, the test tube should be shaken vigorously and then held still until the pyridine layer has risen to the surface. If chloral hydrate is present the pyridine will be colored from a pink to a clear deep red [16,17].

B. *Spectrophotometric Tests:* Treat the substance with quinaldine ethyl iodide to form a blue cyanine dye. The quantity of the dye can be measured spectrophotometrically.

C. Gas chromatography (GC) can be used for quantitative analysis of chloral and its hydrate, which breaks down to chloral on vaporization[18].

D. Liquid–liquid extraction and GC with electron capture detection (GC–ECD), has a detection limit of 0.005 g/L [15,19,20]

E. An indirect differential pulse polarographic method for the determination of formaldehyde and chloralhydrate is described by Sulaiman et al, based on the oxidation of the alkaline sample solutions of formaldehyde and chloralhydrate with a chloroform solution of iodine and removal of its excess. The resulting iodide is oxidized with bromine water and measured polarographically as iodate (at pH 9.3) with sixfold amplification [21].

F. Bruzzoniti et al have studied two liquid chromatographic methods, based on reversed-phase (RP) and anion-exchange mechanisms, for chloral hydrate determination. They have determined that at equimolar concentration 1,2-benzenedithiol can be used for determination of relatively high chloral hydrate concentration by RP (.20 mg/ l) at wavelength of 220 nm. The method developed enables the determination of chloral hydrate at concentration levels (0.2 mg/ l) [7].

Interactions of Chloral Hydrate with Other Substances

Chloral with furosemide can cause undesired haemodynamic effects possibly due to the displacement of chloral hydrate metabolites from the protein-bound state by furosemide [22].

Chloral hydrate with ethanol may cause tachycardia and hypotension even in therapeutic dose possibly because Chloral hydrate slows down the reduction of ethanol by competition for ADH and ethanol enhances the conversion of chloral hydrate to TCE [23].

Management [2,4]

1. Gastric lavage (based on the patient's level of consciousness and history of ingestion) with alkaline solution.
2. Activated charcoal to adsorb chloral hydrate
3. Monitoring
4. Intubation if reduced gag reflex
5. Scandinavian measure
6. Treatment of cardiac arrhythmia:

a. Propranolol

b. Esmolol (short acting beta blocker)

c. Bretylium (adrenergic neuron blocking drug)

7. Treatment of hypotension

a. Infuse 10-20 ml/kg of isotonic fluid

8. Catecholamines (Class IA antiarrhythmics) are contraindicated as they precipitate ventricular arrhythmia
9. Flumazenil 200micro gram infusion followed by 100 microgram at 1 minute interval upto 3 times. Total dose 500 microgram.
10. There is no antidote for chloral hydrate poisoning.
11. Forced diuresis is not useful.
12. Hemodialysis and hemoperfusion useful in severe cases
13. Withdrawal reactions-managed with barbiturates or other sedative–hypnotic agents.

Postmortem Findings

Gastric mucosa is eroded, softened and reddened, and smells of chloral hydrate. Brain and lungs are congested. Damage to kidneys and liver may be seen.

Medico-Legal Aspects

Accidental poisoning results by taking large doses as a hypnotic. Suicidal/homicidal cases are rare. It is mixed with food or drink to render a person suddenly helpless for the purpose of robbery or rape (Date rape drug). Its action is so rapid, hence the name 'knockout drops'. Trichloroethylene has been included in the list of first 10 chemicals to be evaluated for risk under amended Toxic Substances Control Act by US environment protection agency in 2016. EPA is proposing to ban use of TCE in commercial vapor degreasing as a result of identified health risks [24].

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