IJFANS INTERNATIONAL JOURNAL OF FOOD AND NUTRITIONAL SCIENCES
ISSN PRINT 2319 1775 Online 2320 7876

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A Study of Distribution and Determinants of Trauma Injuries Due to Road Traffic Accidents

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ABSTRACT

Background: Road crashes not only place a heavy burden on national and regional economics but also on households. The cost of road traffic injuries is estimated roughly at 1% gross national product (GNP) in low-income countries, 1.5% in middle-income countries, and 2% in high income countries. The direct economic cost of global road crashes have been estimated at USD 518 billion with the cost in low income countries estimated at USD 65 billion exceeding the annual amount received in development assistance. The financial loss to India due to traffic accidents is estimated more than 12000 crore rupees annually.

Objective: To evaluate the influences of associated factors in relation to Road Traffic Accidents (RTA) and to study association between mode of accident and pattern of injuries were the objective of our study.

Methodology: This Prospective, descriptive and co-relational study on pattern of injuries in Road Traffic Accidents is carried out at Department of Forensic Medicine & Toxicology in Santosh Medical College and Hospital, Ghaziabad. There were 98 subjects of road traffic accidents.

Result: The majority 59 (29.64%) fractures are observed in the lower extremity followed by upper extremity 39 (19.59%) and out of 98 victims of Road Traffic Accidents a maximum of 71(35.63%) fractures are found among pedestrian followed by two wheeler users.

Conclusion: The current study illustrates the broad range of variables that contribute to traffic accidents. The epidemiological and medicolegal implications of traffic accidents in this region are also highlighted. The knowledge of the contributing elements to injuries and the suggestions offered in this study aid in averting such mishaps.

Keywords: Road Traffic Accident (RTA), skeletal injuries, retrospective , atherosclerotic cardiovascular disease , traumatic devolving injury

1. INTRODUCTION

Injuries occurring due to Road Traffic Accidents are an inevitable phenomenon, it can occur as per the expectancy of life or caused either by incidents, accidents or suicides [1]. From the

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moment of this planet life just revolves around the basic principle – struggle for life. But during this struggle of ours we have achieved extra-ordinary goals and on the other hand committed preventable mistakes destroying ourselves and increasing the incidence of occurrence of injuries and accidents in our life. According to Aldous Huxley, chances and accidents are only aliases of ignorance [2] An accident has been defined as "an unexpected, unplanned, unforeseen occurrence which may involve injury [3] WHO Advisory group in 1956 defined as an unpremeditated event resulting in an unrecognizable damage[4] According to another definition, an accident is that occurrence in a sequence of events which usually produces unintended injury, death or property damage[5] Injuries are increasingly recognized as a global public health epidemic. Everyday around the world almost 16000 die from all types of injuries. Injuries represent 12% of global burden of disease, the third most important cause of overall mortality and the main cause of death among the population between the age group of 1-40 years [6]. The category of injuries worldwide is dominated by those incurred in road accidents. According to WHO data, deaths from Road Traffic injuries account for 25% of all deaths from injury.[7] Road traffic accidents represent epidemic of non-communicable disease in the present century. They are no longer considered accidental. They are a part of the price we pay for technological progress[8] The Road Traffic Accidents are almost as old as roads. They must have been taking place since the vehicles have started playing on road. Transport system is the key element in the development of every nation and it is achieved by great movement of people and great investment in both vehicles and transport infrastructure. Increased population, urbanizationand industrialization are mainly responsible for the heavy load on the transport system. Though there are tremendous benefits of the roads and vehicles there are certain drawbacks. One most important and hazardous drawback is the loss of life and the loss of man power. Dr Lee Jong Woo, WHO Director General in his message on 7th April 2004 said Everyday as many as 140000 people are injured on the worlds roads. More than 3000 die and some 15000 are disabled for life. [8]
According to a study, the 'Accidental Deaths' due to un-natural causes were mainly on account of Road Accidents in 36.3% cases. [9] There are many reasons for the differences between countries and certainly between developed and developing countries. These might include differences in culture, education, socio-economic characteristics, road user behavior, driver training, vehicle mode and use {eg: trucks used for transportation of people and general overloading of public transport vehicles}, vehicle and road condition, vehicle mix and composition and a higher use of rural and intercity roads by pedestrians and slow moving vehicles. [10]

The spectrum of road traffic accidents is quite immense and all kinds of injuries are possible due to it. This study aims to find out the various epidemiological as well as medicolegal aspects of road traffic accidents in the area of Santosh Medical College and Hospital, Ghaziabad. It is not only an attempt to establish all possible causative factors, pattern and distribution of injuries in road traffic accidents but also will provide path-breaking information about the causative factors for fatal injuries reducing the mortalities by narrowing the time delay in diagnosis. This may help in subsequent management of patients involved in Road Traffic Accidents. The findings of this study will also help the autopsy surgeon while facing the cross examination and guide the court towards reconstruction of the whole accident.

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2. METHODS AND MATERIALS

This study was carried out at the Department of Forensic Medicine and Toxicology at Santosh Medical College and Hospital, Ghaziabad. Prospective, descriptive and co-relational study were used . A written and well informed consent was obtained from each subject of the study whereas in case of death permission was taken from the investigating agency and relatives of the deceased. All victims of road traffic accidents were the study subjects.
Indian roads are divided into three main systems depending on connectivity; the major cities being connected by national highways (primary system), small districts by state highways (secondary system) and town and villages by small roads (tertiary system). Ninety-eight RTA victims that presented and/or were referred to our hospital from 1 June 2007 to 31 May 2009, and subsequently died during treatment and those who were found dead on arrival at our emergency room formed the sample size of the study. It also included dead bodies brought by investigating agencies that presumably had died due to a direct result of injury following RTA. Inclusion was irrespective of the age, gender, ethnicity and severity, location or mode of injury. A detailed medical history was obtained from the relatives of the deceased and/or other alive victims injured in the same accident and/or eye witnesses available at the time of post-mortem examination. Thorough perusal of case papers including investigation, medicolegal register and police records viz. panchanama were carried out to collect other relevant information. Post mortem examination (autopsy) was carried out and all external and internal injuries over the body were recorded. While noting injuries, if one type of multiple injuries were present over a body part, it was considered as one injury. Victims of RTA, who died after 30 days of hospitalisation following the accident, decomposed dead bodies, victims with a dubious history, victims of collision with animals and RTA involving immersion or incineration were excluded. Ethical approval was obtained from the Institutional Ethical Committee of Pravara Institute of Medical Sciences, Loni. Data analysis was done using statistical packages Microsoft Excel 2007 and StatistiXL 1.4.

3. RESULTS

Table 1 shows the distribution of the 98 victims of road traffic accidents ranging in an age group of minimum three years to maximum 85 years. Out of 98 cases 74(75.51%) males and 24(24.48%)females. The male predominance in this study is obvious. The male to female ratio was found to b e3.08:1. Similarly, the marital status wise distribution of the 98 victims of road traffic accident. Overall 77(78.57%) were married and 19 (19.38%) were unmarried victims. Among these married victims majority 60 (61.22%) were married males. In two occasions marital status was not known. These number of victims 29 (29.59%) were from the dependent population (unemployed/ house wife / retired people/ children less than 5 years). Second largest group 19 (19.38%) were labourers and businessmen both being equally affected. Farmer and private employees accounted for 13 (13.26%) and 12 (12.24%) cases. In 2 (2.04%) cases occupation of the victims could not be found. It was observed that majority 24 (24.48%) victims were uneducated followed by 22 (22.44%) were with high school passed, 19 (19.38%) primary, 14 (14.28%) junior college and only 16(16.32%) were with graduate, post graduate or professional education. The month wise distribution of victims of road traffic accident cases. Maximum occurrence was in the month of November 13 (13.26%) followed by January 11(11.22%), while the least number of accidents in June and February i.e. 3

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(3.06%) and 5(5.10%) respectively. Table 2 Shows distribution of external injuries in victims of Road Traffic Accident over different part of the body. Maximum injuries are found on lower extremity i.e. 122 (32.44%) followed by upper extremity with 79 (21.01%) injuries and Abdomen & Pelvis with 74 (19.68%) injuries. The majority 59 (29.64%) fractures are observed in the lower extremity followed by upper extremeity 39 (19.59%). Table 3 shows that the out of 98 victims of Road Traffic Accidents a maximum of 71 (35.63%) fractures are found among pedestrian followed by two wheeler users.

4. DISCUSSION

The present study was conducted in Santosh Medical College and Hospital, Ghaziabad at the Department of Forensic Medicine & Toxicology for a period of two years. The age and sex wise distribution of the 98 victims of road traffic accidents ranging in an age group of minimum three years to maximum 85 years. Out of 98 cases 74 (75.51) are males and 24 (24.48%) are females. The highest number of accidents amounting to 26 (26.53%) are in the age group of 30-39 years, 39 (39.79%) in the 20-29years age group. The least common 05(5.10%) age group affected was 00-09 years. The average age amongst victims of road traffic accidents is 39.7 years. After applying Chi-square test there is no significant association between age in years and sex of victims under study, i.e. $p>0.05$. The male predominance in this study is obvious. The male to female ratio is found to be 3.08:1.The average age of male of victims of road traffic accident is 40.58 years 33(33.06%) of the male victims are in the 20-29 years age group. Amongst female victims the highest number 6 (6.12%) of accidents are observed in agegroupofabove60years.Theaverageageoffemalevictimsoffatalroadtrafficaccidentis37 years. The maximum number of male victims 39(39.79%) , may be due to the fact that this is one of the active periods of life in males who work outdoors and therefore one is most commonly exposed to traffic accidents. According to this study 40.27% fall in the 29-39 years age group. The young and middle age groups largely consist of student; working people in various jobs who usually travel by own vehicles, use the public transportation or walk. The result in the involvement of young adults more commonly in road traffic accidents.[11]

5. CONCLUSION

Maximum victims of road traffic accident i.e. 22(22. 44%) are from the age group 30-39 years. 53.06% are between 20-49 years i.e. productive age group. Majority 29 (29.59%) victims are from the category of unemployed dependent or housewife followed by 19 (19.38%) labourer and business class each. 13 (13.26%) farmers are involved in the accidents and 9 (9.18%) students. Chi-n square test revealed a highly significant association between sex and occupational status of victims under study, i.e. $p<0.05$.Highest number of road traffic accidents 13(13.26%) are recorded in the month of November followed by January 11(11.22%). Least number 3(3.06%) of victims are reported in June. Maximum numbers of fatalities of road victims of road traffic accidents are reported during winter (October-January).Pedestrians and two-wheelers users 28(28.57%) each are the most vulnerable amongst the victims of road traffic accidents. Light motor vehicles are the commonest 28(28.57%) offending vehicles. • All types of skeletal injuries are common in pedestrians. Abrasion was the most common injury i.e. 212 (56.38%) followed by Contusion 84

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(22.34%). Majority 122 (32.44%) of external injuries are over lower extremity followed by upper extremity 79 (21.01%) and Abdomen and pelvis 74 (19.68%). After applying Chi-square test there is a significant association between parts of body and injury i.e. $p<0.05$.Maximum fractures 59 (29.64%) are reported in lower extremity followed by upper extremity 39 (19.59%). Thus, the present study reveals that vast spectrum of factors involved in road traffic accidents. It also highlights the epidemiological and medico-legal aspects of road traffic accident in this area. The information regarding the causative factors for injuries and the recommendation made in this study help in preventing such accidents.

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Table 1: Demographic distribution of victims of road traffic accidents. (n=98)

Characteristics		Total No. (%)
Age group (yrs)	00-09	05(5.10)
	10-19	08(8.16)
	20-29	13(13.26)
	30-39	26(26.53)
	40-49	13(13.26)
	50-59	17(17.34)
	>60	16(16.32)
Sex	Male	74(75.51)
	Female	24(24.48)
Occupational status	Farmer	13(13.26)
	Laborer	19(19.38)
	Student	09(9.18)
	Govt. employee	07(7.14)
	Business	19(19.38)

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	Private employee	12(12.24)
	Dependent	29(29.59)
	Unknown	02(2.04)
Educational status	Primary school	19(19.38)
	High school	22(22.44)
	Jr.college	14(14.28)
	Graduation & above	16(16.32)
	Uneducated	24(24.48)
	Unknown	03(3.06)
Month	January	11(11.22)
	February	05(5.10)
	March	10(10.20)
	April	10(10.20)
	May	10(10.20)
	June	03(3.06)
	July	06(6.12)
	August	07(7.14)
	September	08(8.16)
	October	06(6.12)
	November	13(13.26)
	December	09(9.18)
Total		98(100)

Table 2: Distribution of external injuries in Victims of Road Traffic Accidents over different part of the body.

	Part of the Body	**Total No.(%)**
External injuries	Head, Neck & Face	55(14.62)
	Upper Extremity	79(21.01)
	Thorax	46(12.34)
	Abdomen &Pelvis	74(19.68)
	Lower extremity	122(32.44)
Fractures in Victims	Skull	24(12.06)
	Face	32(16.08)
	Spine	07(3.51)
	Thorax	31(15.57)
	Pelvis	07(3.51)
	Upper extremity	39(19.59)
	Lower extremity	59(29.64)

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Table 3: Distribution of skeletal injuries amongst different categories of victims of Road Traffic Accidents

Categories of road users	Part of the body							Total no. of fractures (%)
	Skull	Face	Spine	Thorax	Pelvis	Upper extremity	Lower extremity	
Pedestrian	07(3.51)	12(6.03)	04(2.01)	11(5.52)	06(3.01)	13(6.53)	18(9.04)	71(35.6)
Bi-cyclist	2(1)	0	0	1(0.5)	0	1(0.5)	3(1.5)	7(3.5)
Two Wheeler	6(3.01)	7(3.5)	1(0.5)	7(3.5)	0	8(4.02)	18(9.04)	47(23.6)
Three Wheeler	2(1.00)	5(2.51)	0	3(1.50)	0	4(2.01)	4(2.01)	18(9.04)
Light Motor Vehicle	4(2.01)	5(2.51)	1(0.50)	4(2.01)	0	6(3.01)	9	29(14.6)
Heavy Motor Vehicle	1(0.50)	1(0.50)	0	4(2.01)	0	3(1.50)	2(1.00)	11(5.5)
Tractor	1(0.5)	1(0.5)	1(.0.5)	1(0.5)	1(0.5)	3(1.5)	2(1)	10(5)
Bullock Cart	1(0.5)	1(0.5)	0	0	0	1(0.5)	3(1.5)	6(3.01)
Total No (%)	24(12.1)	32(16.1)	7(3.5)	31(15.6)	07(3.5)	39(19.6)	59(29.6)	199(100)