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Socio-demographic analysis of injury pattern among road traffic accident victims admitted in a tertiary care hospital

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Abstract

Background: Injuries and deaths due to road traffic accidents (RTAs) are one of the major public health problems across the globe especially in developing countries due to lack of comprehensive legislative measures. This loss of lives has immeasurable impact on the socio-economic output of the society. This study aimed to assess the factors and patterns of injuries related to RTAs.

Materials and Methods: This is a hospital based retrospective cross sectional study conducted in the Department of Trauma Surgery in a tertiary care hospital. Victims of road traffic accidents attending casualty from 1st July to 31st December 2019 were studied.

Results: Of 1442 RTA victims, maximum (29.47%) was in the age group of 20 to 29 years and 75.93% were male. 37.73% victims were using two wheelers while 26.05% using four wheeler. Most of the accidents (36.21%) took place in the evening (6 pm to 12 midnight). Most common site of injury was head, face & neck (35.64%) followed by lower limb (33.49%). 31.27% of involved drivers were under influence of alcohol during accident.

Conclusion: Being in younger age group, male gender, evening time, drunk driving and driving hours on the road were positively associated with RTA. Preventive measures to reduce the burden of mortality and morbidity due to road accidents should be strengthened.

Keywords: Road traffic accident, victims, injury pattern, head injury, alcohol

Introduction

Globally, road traffic accidents (RTAs) are common public health problem and established as the eighth leading cause of death which has at least similar impact as other major communicable and non-communicable diseases, if not more ^[1, 2]. Around 1.35 million people have unnatural deaths and 20 to 50 million people suffer from non-fatal injuries due to road traffic injuries in the world each year ^[3]. Approximately 90% of the estimated 1.3 million deaths from RTI occur in low and middle-income countries. ⁴ RTAs are projected to become the 5th largest contributor to global disease burden by 2030 ^[5, 6].

The death toll is highest and still growing in low and middle-income countries, where pedestrians, motorcyclists, cyclists and passengers are especially vulnerable. Despite this burgeoning problem, little attention has been paid to road traffic injury prevention and treatment in most developing countries. India accounts for about 10 percent of road accident fatalities worldwide. In 2017, deaths due to road traffic collision in India were 147,913, that is, 405 deaths each day ^[7]. In the state of Uttarakhand, 10.8 persons are killed per 10000 motor vehicles which is very close to national average of 10.9 ^[8]. RTAs are the leading cause of death for children and young adults aged 5-29 years. It causes considerable economic losses to individuals, their families, and to nations as a whole ^[3]. The economic impact of RTA results in more than 3.7% loss of national GDP of India. RTA, trauma, and death are increasing steadily with increase in number of vehicle on road, more prosperity leading to increased travel and host of other factors associated with poor engineering of the roads, negligent and rash driving, unchecked speed of vehicles on road, driving under influence of various substances, lack of alertness and diversion of mind and numerous other factors ^[9].

India has one of the poorest and worst records of road safety in the world. Trauma victims, who deserve immediate attention, do not get the priority because of lack of fund, lack of administrative focus on the problem, lack of infrastructure, initiative and vision. The multiplication of institution and the absence of dedicated authority with responsible attitude add up to ongoing misery. Information on the injury pattern, nature, and outcome are extremely limited in India, as trauma registries and hospital based research have not developed systematically [9, 10]. A body of literatures have shown that systematic identification of risk factors and sociopolitical determination to address those factors have led to improved mortality rate from road traffic accidents [11, 12].

Deaths and injuries due to RTA are preventable. A wide range of effective road safety interventions exist and a scientific systematic approach to road safety is essential to tackle the problem. Geographical variations are unique in hilly regions of Northern India (Uttarakhand) where the knowledge related to road safety and road constructions are comparatively poor. The quick response teams are often less accessible and even if they reach, they are unable to deal with the accidents in a judicial and scientific way because of lack of knowledge. RTA related factors and patterns of injuries related literatures are sparse in this region. Therefore, this study aimed to assess the factors and patterns of injuries related to RTAs in this geographical location.

Material and Methods

The study was carried out at All India Institute of Medical Sciences (AIIMS), Rishikesh, Dehradun which is a referral tertiary care hospital and one of the apex health care institute of India. This study is a retrospective record based cross sectional study. The study population consisted of road traffic accident victims of all age groups reporting to Trauma Surgery casualty over a period of six month i.e., between 1st July 2019 to 31st December 2019. For the purpose of the study, an RTA was defined as an accident which took place on the road between two or more objects, one of which must be any kind of moving one [14, 15]. Any injury on the road without involvement of a vehicle (eg. a person slipping or falling on the road and sustaining injury) or injury involving a stationary vehicle (eg. person getting injured while washing or loading a vehicle) or deaths due to RTA were excluded from the study.

Prior permission from institutional ethical committee of AIIMS was taken for conducting the study and mainly included access to records. Data were collected from case sheets and medicolegal records of victims. A pre-tested proforma specially designed for this purpose was used for collection of data. The information collected consisted of demographic profile of victims, type of vehicle involved, site and severity of injury, and whether the involved driver had consumed alcohol or not. The obtained data was entered into Microsoft excel, checked for any error and analyzed using SPSS (Statistical Package for Social Sciences) version 18.0 database (SPSS Inc., Chicago, IL). Interpretation of the data was done by using descriptive statistics like frequency and the percentage.

Results

A total of 2365 trauma cases were reported to Trauma Surgery casualty during the study period, out of which total number of road traffic accident victims were 1442.

Age and sex distribution of victims: Majority of RTA cases

in this study (Table 1) were male 1095 (75.93%), while 347(24.06%) were female, indicating 3.15:1 male female ratio. Maximum (n=425, 29.47%) cases were from the age group of 20 to 29 years followed by 30 to 39 years (n=339, 23.50%) and 40 to 49 year (n=225, 15.60%) respectively. There were 14.2% of cases in age of 50 years and above, while 17.19% were under 20 years of age.

Table 1: Age and sex distribution of victims

Age group	Male No. (%)	Female No. (%)	Total No. (%)
0-9	43(2.98)	17(1.17)	60(4.16)
10-19	144(9.98)	44(3.05)	188(13.03)
20-29	346(23.99)	79(5.47)	425(29.47)
30-39	267(18.51)	72(4.99)	339(23.50)
40-49	173(11.99)	52(3.60)	225(15.60)
50-59	57(3.95)	42(2.91)	99(6.86)
60-69	43(2.98)	28(1.94)	71(4.92)
≥ 70	22(1.52)	13(0.90)	35(2.42)
Total	1095(75.93)	347(24.06)	1442(100)

Type of injured and vehicles involved: Drivers constituted the largest (n=681, 47.22%) group of victims and 31.27% of them were under the influence of alcohol during the accident. Pedestrians and occupants including pillion rider were 259 (17.96%) and 502 (34.81%) of RTA victims respectively. Most common vehicle-type involved (Table 2) was two wheelers (n=323, 37.73%) followed by four wheelers (n=223, 26.05%) and three wheelers (n=92, 10.74%). Bus was involved in 8.29% cases while truck and bicycle were victims in 6.54% and 5.49% cases respectively.

Table 2: Type of vehicles involved in RTA

Type of vehicle	No. (%)
Bicycle	47(5.49)
Two wheeler	323(37.73)
Three wheeler	92(10.74)
Four wheeler	223(26.05)
Bus	71(8.29)
Truck	56(6.54)
Tractor	26(3.03)
Bullock cart	18(2.10)
Total	856(100)

Site of injury: In this study (Table 3), 35.64% of cases had injuries to head, neck & face followed by 33.49% (n=483) of cases who had injuries to lower limb and 24.34% (n=351) of cases had multiple site injuries. Thorax was involved in 220 (15.25%) cases, spine in 181 (12.55%), upper limb in 154 (10.67%) and pelvis in 85 (5.89%) cases.

Table 3: Site of injury

Site of injury	No. (%)
Head, face & neck	514(35.64)
Thorax	220(15.25)
Abdomen	122(8.46)
Upper limb	154(10.67)
Lower limb	483(33.49)
Spine	181(12.55)
Pelvis	85(5.89)
Multiple site injury (more than one system injury)	351(24.34)

Time of occurrence of RTA: Most of the accidents (Table 4) took place in the evening (6 PM to 12 midnight) i.e. 310 (36.21%) followed by morning hours (26.05%), afternoon (25%) and night (12.73%).

Table 4: Time of occurrence of RTA

Time of occurrence	No. (%)
6 AM to 12 Noon	223(26.05)
12 Noon to 6 PM	214(25)
6 PM to 12Midnight	310(36.21)
12 Midnight to 6 AM	109(12.73)

Discussion

Road traffic accidents constitute a significant and increasing contributor to national and global disease burden. It has immeasurable impact on the families affected by RTA. This study aimed at understanding the incidence and pattern of road traffic injuries (RTIs) in this geographical location (Uttarakhand). The findings of this study may provide insights on better management of RTAs victims.

In this study, the maximum (29.47%) cases were from the age group of 20 to 29 years followed by 30 to 39 years and 40 to 49 year respectively. Similar results were found in studies conducted by Pathak^[15], Kakkar^[16] and Solanki^[17] study. The younger generation often has risk-taking behaviors, and this may explain the findings. This shows that most active and productive age group population is involved in RTAs, leading to serious economic loss to the community. A male predominance was noticed in present study with males accounting for 75.93% of cases while females were 24.06%. RTA was more common in males due to the preponderance act of motor vehicle driving and more outdoor activity than females. Similar observations were also made by others^[14, 17, 18]. However, a study from Albania shows a different results with more common involvement of females in RTA, may be due to socio-economic reasons^[19].

In present study, drivers (47.22%) constituted the largest group of victims followed by occupants including pillion rider (34.81%) and pedestrians (17.96%). Pathak found 67% of patients were driving the vehicle when the accident happened and 14.3% patients were pedestrians^[20]. In Misra study, 41.9% victims were occupants (passengers/pillion riders), followed by drivers (38.2%) and pedestrians (19.9%)^[10]. However, in study by Shrestha, majority of victims were passengers (55.4%) followed by drivers and pedestrians^[1]. A study from Kenya reported that majority of RTI victims were pedestrians (30.8%)^[21].

Most common vehicle involved in this study was two wheelers (37.73%) followed by four wheelers (26.05%), three wheelers (10.74%) and bus (8.29%). These findings showed higher involvement of two wheelers when compared to study done by Jha in Pondicherry who observed that two wheelers were involved in 24.4% cases^[22]. Chourasia study found 78.3% involvement of two-wheeler followed by light motor vehicle (15.9%) and heavy motor vehicle (5.7%)^[23]. Misra reported that victim's vehicle involved in majority of cases was a motorized two-wheeler (53.4%) and the opposite colliding vehicle was a four-wheeler (39.3%) in most cases.¹⁰ Shrestha also found that two wheeler (38.4%) was most commonly involved in RTA followed by four & six wheeler^[1]. These reflect that two wheeler is most common mode of transport in India. Increased involvement of two wheelers in RTA may be due to the reckless driving, not wearing helmets, bad road condition or negligence of traffic rules. However, study by Choulagai in Nepal found that six wheelers were more involved than others^[24].

In the present study, 31.27% of drivers involved were under the influence of alcohol during the accident. This is in higher proportion when compared to study done by Neeluri who found that 22.5% were under influence of alcohol during the accident^[18]. The role of alcohol in impairing driving ability is well documented. Also, the impairment level increases as the

blood alcohol level rises. In addition, the risk of accidents are higher in youngsters compared to elderly people for similar blood alcohol level^[25].

In this study, injury to head, neck and face was most common site of involvement which occurred in 35.64% of cases followed by lower limb (33.49%), thorax (15.25%), spine (12.55%) and upper limb (10.67%). 24.34% cases had multiple site injuries. Patan found that head was the commonest (68.8%) site of injury followed by knee & lower leg (32.7%) and shoulder & upper arm (23.9%).²⁶ Multiple body regions were involved in 4.3% of cases in their series. Neeluri in their study had 40.7% cases of lower limb injuries followed by 22.10% of cases who had injuries on head and face and 17.80% of cases had multiple injuries.¹⁸ These findings were contrary to the study conducted by RaviKiran in Mangalore who observed that most common site of injury was abdomen (49%).²⁷ Study by Al-Thaifani reported that most common site of injury was lower limb (42.18%) followed by head (17.93%) and thorax (11.81%).²⁸ Lack of helmet use may be the possible reason for more head injury among two wheeler users. Similarly, more injuries on upper body parts in motor vehicle occupants may be due to lack of seat belt use, resulting in forward jerk during a collision and higher rate of injury. Knowledge of injury pattern could be helpful while planning emergency and trauma care services and also in designing and implementation of safety measures.

In the present study, most of the accidents took place in the evening (6 PM to 12 midnight) i.e. 36.21% followed by morning hours (26.05%), afternoon (25%) and night (12.73%). Evening hours are busiest as commuters go to and return from the schools, offices, factories and business. Similar findings were seen by Neeluri study.¹⁸ This finding was in contrast to study by Shah, in which majority of accidents occurred in morning hours (6 AM to 12 PM).²⁹ Shrestha also found that 50% of the accidents were in the morning (6.00 am - 12.00 pm) time followed by 31.2% in between 12.00 pm to 6.00 pm^[1].

Conclusion

Present study showed that road traffic accidents were more common in the younger population and active males. Two & four wheelers were more vulnerable and good number of drunk drivers were involved. Head, neck & face injury was found to be most common. The rate of accident was higher during evening hours probably because of higher traffic.

Recommendations

The incidence of road traffic accidents can be minimized by use of properly designed helmet especially among riders of two wheelers, use of seat belt among travellers in four wheelers and increasing the awareness among the drivers and community in general. Government should step in for efficient transport system, safe traffic rules, cashless treatment policy in emergency, instructions for strict governance and implementation of driving license, traffic rules and regulations by police and transport authority^[9].

During planning of new road, alignments on the hills has to be ensured, and unstable land, slopes and cracked areas prone to landslide and washing away should be averted. The protective measures include parapet or guide walls, safe barriers, proper drainage, suitable sign-ages, markings, etc should be installed. During fog, use of luminous paints or strips should be used for signboards^[30].

Strict enforcement of the existing legislations regarding usage of helmets, seatbelts as well as avoidance of driving under the influence of alcohol and using cell phone while driving is the need of the hour.

Limitations of the Study: Firstly, fatal cases were not included in this study so the cause of mortality due to RTAs could not be gathered. Secondly, this is a single hospital based study with small sample size and shorter duration, hence results of this study may not be generalized to general population but still be useful in preparation of a good database for future studies and other uses. Thirdly, Injury Severity Scoring (ISS) or Trauma severity scoring was not included in this study.

Declarations

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