A study of road traffic injury victims at a tertiary care hospital in Goa, India

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ABSTRACT

Background: While road traffic accidents are declining in many developed countries, fatalities are still on the rise in many developing countries including India. More than half of the road traffic injury (RTI) victims are in the age group of 20–55 years, which constitutes the key wage-earning and child-raising age group. Objective: To study the socio-demographic profile of RTI victims and to study the pattern of injury among them. Methods and Material: The RTI victims brought to the casualty of Goa Medical College and Hospital were interviewed using a predesigned questionnaire following transfer to in-patient wards after initial stabilisation in the casualty. Data are expressed as proportions and presented using graphs and charts. Results: A majority of the RTI victims, i.e., 134 (30.45%) were in the age group of 30–40 years. The findings reveal that 33 (13.04%) RTI victims did not have a valid driving licence, while the use of alcohol within 6 h before accident was seen in 38 (12.75%) RTI victims; 234 (65.36%) victims were not using a seat belt or helmet and 350 (79.55%) victims had grievous injuries. Conclusions: A high number of drivers were driving without a valid driving licence while a good number of RTI victims consumed alcohol putting themselves as well as other commuters at risk. There is a need for increasing awareness among the road users and community regarding road safety. Government authorities should ensure consistent and strict implementation of traffic rules as well as accelerate the implementation of road-safety preventive measures.

Keywords: Road safety, road traffic accident, road traffic injury

Introduction

Road traffic accidents (RTAs) can happen to almost anyone and anywhere, although they are unintended and largely preventable risks to lives. They pose a threat to public health and national development in many developing as well as developed countries. RTAs also contribute significantly to poverty by causing deaths, injuries, disabilities, reduced productivity and material damage. Even though 60% of the world’s vehicles are present in low-income and middle-income countries, these countries report 93% of the world’s road traffic fatalities.[1]

While RTAs are declining in many developed countries, fatalities are still on the rise in many developing countries including India. In Goa, during 2016 there were 217.7 accidents per lakh population, which is the highest rate among all the states of India.[2] More than half of the road traffic injury (RTI) victims are in the age group of 20-55 years who are in the key wage-earning and child-raising age groups. The loss of the breadwinner or head of a household due to death, injury or disability can be catastrophic. It often leads to a lower standard of living and drives them deeper into poverty. This study is an attempt to highlight the root causes of RTAs and to study the patterns of injury among RTI victims in Goa.

Subjects and Methods

The present cross-sectional study was conducted in a tertiary care hospital in Goa catering to a domestic population of approximately 15 lakhs. The RTI victims brought to casualty were

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included in the study after they were transferred to in-patient wards upon initial stabilisation in the casualty. The study and its purpose were explained to the patient or the relative and written informed consent was taken for participation in the study either from the patient or from a relative when the patient was unable to give consent. The study included 440 RTI cases admitted over 1 year (January 2017 – December 2017). For the study, an operational definition of road traffic accident victim was devised and used throughout the study. A road traffic accident victim was defined as “any person involved in an accident which took place on road (including the sidewalk or footpath) between two or more objects, with at least one being a moving vehicle.”

All patients with road traffic injury admitted for more than a period of 24 h were included. Cases of road traffic accident admitted for less than 24 h, admitted in ICU ward, not willing to give consent and patients brought dead were excluded.

Data were collected using a predesigned questionnaire following a pilot study to ascertain the feasibility of the study. The questionnaire was administered by face-to-face interview by the interviewer. It included socio-demographic variables and factors likely to be associated with RTAs, especially vehicle-related factors, patient characteristics and environmental factors.

The sampling method used was simple random sampling. The patients were selected after obtaining the list of the total number of RTI patients admitted on the previous day of the interview.

A sample size of 420 was calculated using an average prevalence of 0.5 of the relevant risk factors reported by various studies in India and an absolute error of 0.05.

The collected data were entered and analysed using Statistical Package for the Social Sciences (SPSS) Software Version 22. The study variables were expressed as proportions and percentages and presented using graphs and charts. Ethics approval was obtained from Institutional Ethics Committee before commencement of the study.

### Results

Table 1 shows the socio-demographic profile of the RTI victims. Most of them, i.e., 134 (30.45%) were in the age group of 30-40 years, followed by those who belonged to the age group of 20-30 years who were 114 (25.9%). Sex-wise distribution showed a significant preponderance of male gender, with 322 (73.18%) victims being males, whereas only 118 (26.82%) being females. A majority of RTI victims, i.e., 236 (53.64%) were rural inhabitants whereas 204 (46.36%) resided in urban areas. The study results show that 302 (68.64%) victims were Hindus, followed by 90 (20.45%) Christians. Only 42 (9.55%) RTI victims were Muslims while the remaining 6 (1.36%) belonged to Sikh and Jain religions. The study revealed that more than half of the RTI victims, i.e., 244 (55.45%) were married whereas 144 (32.73%) were unmarried. The remaining were either widowed, divorced or separated. Using the modified BG Prasad socio-economic classification, the study revealed that the majority of RTI victims, i.e., 147 (33.4%) belonged to the middle class, followed closely by 142 (32.3%) who belonged to the upper middle class.

Figure 1 depicts the source of information for the RTI victims. The information was primarily obtained from relatives of 240 (54.55%) victims. About one-fourth of them, i.e., 108 (24.55%) were able to give information on their own and were the primary source of information. The information was obtained from bystanders or police who brought the patient to the hospital only for 24 (5.45%) RTI victims.

Table 2 shows the factors related to RTAs. It is seen that 90 (23.56%) RTI victims were not the owners of the vehicles involved in the road traffic accident. The vehicle belonged either to a friend, relative or to the person who employed the RTI victim. Excluding passengers, pedestrians and cyclists, a significant number, i.e., 33 (13.04%) drivers or riders of the vehicles involved in the RTAs were not having a valid driving licence (n = 253). On inquiring about alcohol and tobacco use, regular alcohol use was found in 40 (9.1%) of the RTI victims, smokeless tobacco use was reported by 22 (5%) and cigarette smoking was reported by 32 (7.3%) RTI victims. Use of alcohol

| Table 1: Age-wise distribution of RTI victims (original) |
|--------------------------------------------------------|
| **Age group (Years)** | **Frequency (n)** | **Percentage (%)** |
| < 10                  | 10              | 2.27            |
| 10-20                 | 44              | 10.00           |
| 20-30                 | 114             | 25.91           |
| 30-40                 | 134             | 30.45           |
| 40-50                 | 68              | 15.45           |
| 50-60                 | 42              | 9.55            |
| > 60                  | 28              | 6.37            |

| **Sex**          | **Frequency (n)** | **Percentage (%)** |
|------------------|-------------------|--------------------|
| Male             | 322               | 73.18              |
| Female           | 118               | 26.82              |

| **Residence**   | **Frequency (n)** | **Percentage (%)** |
|-----------------|-------------------|--------------------|
| Rural           | 236               | 53.64              |
| Urban           | 204               | 46.36              |

| **Religion**   | **Frequency (n)** | **Percentage (%)** |
|----------------|-------------------|--------------------|
| Hindu          | 302               | 68.64              |
| Christian      | 90                | 20.45              |
| Muslim         | 42                | 9.55               |
| Others         | 6                 | 1.36               |

| **Marital status** | **Frequency (n)** | **Percentage (%)** |
|--------------------|-------------------|--------------------|
| Married            | 244               | 55.45              |
| Unmarried          | 144               | 32.73              |
| Others             | 52                | 11.82              |

| **Socio-economic class** | **Frequency (n)** | **Percentage (%)** |
|--------------------------|-------------------|--------------------|
| Upper                    | 37                | 8.4                |
| Upper middle class       | 142               | 32.3               |
| Middle class             | 147               | 33.4               |
| Lower middle class       | 73                | 16.6               |
| Lower class              | 23                | 5.2                |
| Not known                | 18                | 4.1                |
within 6 h before the accident was seen in as high as 38 (12.75%) RTI victims who were actively involved in the crash (pillion riders and passengers were excluded). The drivers were reportedly healthy and fit to drive the vehicle in 246 (81.46%) RTIs at the time of the accident.

Out of the 252 RTI victims, a significant number, i.e., 46 (18.26%) RTI victims reported that there was an obstruction on the road which led to the accident. Most of these obstructions included an animal crossing or sitting on the road, movable dividers lying across the road, a pedestrian, road construction debris and other stationary objects like tree branches, etc. The study results also showed that a high proportion, i.e., 234 (65.36%) RTI victims were not using a seat belt or helmet. Most of the accidents, i.e., 306 (69.5%) took place during the day, followed by night time which was reported by 90 (20.5%) RTI victims.

Assessment of the type of injury sustained by the RTI victims revealed that 350 (79.55%) had grievous injuries as compared to 90 (20.45%) who had simple injuries. Figure 2 depicts the pattern of injury among the RTI victims included in the study. It is seen that the commonest pattern of injury was soft tissue injury among 429 (97.5%) victims. This was followed by bone and/or joint injury which was present in 272 (61.8%) victims. Abdominal trauma was present in 182 (41.4%), head and/or face and/or neck injuries were present in 86 (19.5%), chest trauma was seen in 42 (9.5%) and 2 (0.45%) had other injuries like injury to the genitals.

**Discussion**

The majority of the RTI victims, i.e., 134 (30.45%) were in the age group of 30-40 years, followed by 114 (25.9%) who belonged to the age group of 20-30 years. As per the report “Road accidents in India – 2016” by the Ministry of Road Transport and Highways, Government of India, for the year 2016, the highest road traffic fatalities, i.e., 25.3% were in the age group of 25 – 35 years[8]. In Goa, during the year 2016, as per the report “Goa: Disease Burden Profile, 1990 – 2016” published by the Institute for Health Metrics and Evaluation, the burden of road traffic injuries was 12.1% in the age group of 15 – 39 years[9]. The current study shows that the people at the extremes of age are least involved in road traffic crashes. This may be due to a more responsible attitude, the driving experience of older people and their limited use of motor vehicles. Whereas very young people travel infrequently as compared to older individuals. Also,
elderly people mostly tend to stay indoors and lead a less active life. A sex-wise distribution showed a significant preponderance among males, which is like studies done elsewhere by Jha N et al.[8] in Puducherry and Biswas S et al.[9] in West Bengal. Such a finding may be because in our society mostly male members of the family constitute the breadwinners of their families, and thus, are more involved in outdoor activities, and therefore, prone to accidents. Also, males are more likely involved in risk-taking behaviour like overspeeding and driving under influence of alcohol.

About half, i.e., 236 (53.64%) victims were rural inhabitants though the majority, i.e., 62% of Goa’s population resides in urban areas as per census 2011.[8] This may partly be because most of the patients who visit government hospitals are the rural poor. The higher socio-economically privileged urban patients may be seeking private healthcare. The study revealed that more than half of the RTI victims, i.e., 244 (55.45%) were married. The finding of the study is likely due to the age composition of the RTI victims that were interviewed. A majority of them belonged to the age group of 30 – 40 years which is a reproductive age group, and by this age, a majority of people settle down and get married. Using the modified BG Prasad socio-economic classification, the study revealed that a majority of RTI victims, i.e., 147 (33.4%) belonged to the middle class. In a similar study done on fatalities due to road traffic crashes in Kolkata, it was observed that most of the victims belonged to the lower middle class (40.7%), followed by the lower class (31.1%), whereas only 2.9% belonged to the upper middle class, and 4.1% to the upper class.[7] The study results show that road traffic injuries are more often seen in the middle and lower socio-economic classes. This is a significant finding because people belonging to lower socio-economic classes have difficulties in earning a decent livelihood and road traffic injuries put an additional burden on these families driving them deeper into poverty.

As the study was conducted among the RTI victims who were admitted for more than 24 h in the hospital, the victims were serious patients requiring in-patient care, and thus, accompanied by a relative. Hence, the information was primarily obtained from relatives of 240 (54.55%) RTI victims. The study findings reveal that 90 (23.56%) victims were not the owners of the vehicles involved in the road traffic accident. The vehicle belonged either to a friend, relative or to the person who employed them. A study done by Bener A et al.[6] on Qatari drivers reported that 73.5% of the study participants who had road traffic accidents were owners of the vehicle they were driving at the time of the accident. The study did not reveal any significant association between ownership of the vehicle and the severity of the injury. A study done in Ethiopia by Asefa et al.[10] reported that road traffic collisions were more common among hired drivers (83.6%) than those by the owners of the vehicles (15%).

The study findings revealed that a significant number, i.e., 33 (13.04%) drivers or riders of the vehicles involved in the RTAs were not having a valid driving licence. The study finding highlights the need for consistent implementation of traffic laws to ensure road safety. Regular alcohol use was found in 40 (9.1%) of the RTI victims, smokeless tobacco use was reported by 22 (5%) and cigarette smoking was reported by 32 (7.3%) RTI victims. Alcohol and other substance use go hand in hand with risk-taking behaviour and can also impair judgement and concentration if driving is done while intoxicated or in a withdrawal state. This increases the possibility of getting involved in a fatal crash and thus adds to the burden of road traffic injuries. Use of alcohol within 6 h before the accident was seen in as high as 38 (12.75%) RTI victims who were actively involved in the crash. It is evident that a high proportion of individuals are involved in drunken driving which not only puts their own life in danger but also makes the road unsafe for other innocent road users including pedestrians.

The drivers were reportedly healthy and fit to drive the vehicle in 246 (81.46%) RTIs at the time of the accident. The Ministry of Transport and Highways, Government of India, in its report titled “Road accidents in India – 2016” reported that 1.1% of the total RTAs in India in the year 2016 were attributed to the driver being sleepy, fatigued or sick.[3] Out of the 252 RTI victims, a significant number, i.e., 46 (18.26%) RTI victims reported that there was an obstruction on the road which led to the accident. The presence of obstruction on the road is a serious risk for RTAs and endangers the lives of those using the road either as vehicle occupants or pedestrians. With the advancement in technology, vehicles have become faster, more powerful and capable of attaining high speeds. This increases the force of impact following RTAs thus causing more serious injuries to the victims. The study results showed that 234 (65.36%) RTI victims were not using a seat belt or helmet. This shows that a large number of individuals are vulnerable to road traffic injuries as they do not follow safety precautions as per the prevailing road traffic rules. Such risky behaviour is likely to increase the incidence as well as the severity of road traffic injuries among the general population. In a similar study done in Telangana, it was seen that only 26.19% of the victims used helmets while riding and only 18.18% of the victims used seat belts while driving.[10] A majority of the accidents, i.e., 306 (69.5%) took place during the day as the majority of people commute during the daytime.

The study reveals that 350 (79.55%) RTI victims had grievous injuries as compared to 90 (20.45%) who had simple injuries. A high proportion of grievous injuries is most likely because this study included RTI victims admitted to the hospital and not those treated and sent on an out-patient basis. Figure 2 depicts the pattern of injury among the RTI victims. It is seen that the commonest pattern of injury among the RTI victims was soft tissue injury among 429 (97.5%) victims. This was followed by bone and/or joint injury which were present in 272 (61.8%) RTI victims. In a study published by Celine TM et al.[11] in Kerala, it was observed that head injuries reported among the total road traffic accident cases were 4,686 (61.2%), while 3,271 (42.7%) had fractures. In a study done to review various forms of injuries in drivers involved in RTAs by Ossei PPS et al.[12] in Ghana, it was seen that the most common trauma among RTI victims was...
head injury (58.3%), followed by polytrauma (19.7%). The pelvic injury had the least incidence seen in 0.8% of all trauma cases.

**Conclusion**

The study findings reveal that road traffic injuries were more common in the younger age groups. A high number of drivers and riders were driving without a valid driving licence while a good number of RTI victims consumed alcohol before driving or riding putting themselves as well as other commuters at risk of road traffic accidents. There is a need for increasing awareness among the road users, families and the community regarding road safety. Government authorities should ensure consistent and strict implementation of the traffic laws to ensure road safety as well as accelerate the efforts of road safety preventive measures.

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**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**

There are no conflicts of interest.

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