

Epidemiological profile of victims in road traffic accidents: a hospital-based study

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Abstract

Background: Over the past 20 years there is rapid urbanization and population is increasing to an alarming proportions. Death rates in most of the countries have declined and life expectancy has increased; but traffic injuries have emerged as a highly visible cause of morbidity, disability, and mortality.

Objective: To investigate the details and factors responsible for road traffic accidents.

Materials and Methods: This cross-sectional, hospital-based descriptive study was carried out in more than 500 road traffic accident cases reporting to casualty of the hospital. The data regarding the sociodemographic factors, antecedent factors, and vehicular factors responsible for road traffic accidents were collected in predesigned and pretested pro forma. Besides, information regarding first aid was also obtained. Statistical analysis was carried out using χ^2 -test with $p < 0.05$ was considered as the significant value.

Results: A total of 190 (38%) accidents happened at roads that were of single lane and 310 (62%) on two or more lane roads. Maximum 156 (31.2%) number of cases were unskilled workers and laborers. The majority of the victims (233, 46.6%) were drivers and majority of the drivers were males. The next major groups involved were the pedestrians 107 (21.4%) followed by passengers 98 (19.6%) and others 62 (12.4%). The majority of the victims (367, 73.4%) had monthly per capita income less than 3000 rupees.

Conclusion: Drivers constitutes the major victims followed by pedestrians. All road users are concerned in the prevention of accidents, but attention must focus especially on drivers of motor vehicles, because they may endanger the lives of road users as well as their own.

KEY WORDS: Road traffic accidents, injuries, drivers, pedestrians

Introduction

Road traffic accidents (RTAs) are increasing with rapid pace and presently these are one of the leading causes of death in developing countries.^[1] Injuries due to RTAs are

currently ranked ninth globally among the leading cause of disability adjusted life year and the ranking is projected to rise to third by 2020.^[2] Recognizing the magnitude of the problem, the World Health Organization in 2004 had its theme as "Road safety: is no accident." This may be interpreted in two ways, that is, roads are safe only when there are no injuries on the road (including footpaths and sidewalks), which is straightforward. But the most important point is that road safety cannot be achieved unless there is a sincere effort from all the areas concerned with road safety.^[3]

In India, more than 80,000 persons die in the traffic crashes annually, more than 1.2 million injured seriously, and about 300,000 disabled permanently. In India, for individuals more than 4 years of age, more life years are lost due to traffic crashes than due to cardiovascular diseases or neoplasm.^[1]

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Thus, India is passing through the triple epidemic of communicable and infectious diseases, noncommunicable diseases, and injuries due to epidemiological and demographic transition. An injury is defined as a "body lesion at the organic level resulting from acute exposure to energy (mechanical, thermal, electrical, chemical, or radiant) interacting with the body in amounts or rates that exceed the threshold of psychological tolerance."^[4]

As the foregoing data reveal that RTAs are a burden on the society and stresses a need of serious effect, hence this study is a sincere effort to investigate the factors responsible for RTAs.

Materials and Methods

This cross-sectional, hospital-based descriptive study was carried out in more than 500 RTA cases reporting to casualty of Guru Gobind Singh Hospital, Faridkot, Punjab, India, from May to December 2013. Ethical clearance was obtained before the commencement of the study. Informed consent was taken from the patients. A pretested questionnaire was designed for elucidating the information about circumstances leading to accidents and the other demographic variables. A pilot study was carried out for a period of 1 month to assess the feasibility of the study by using predesigned pro forma and accordingly certain required minor modifications were made. All the patients admitted in casualty injured in RTAs were included in this study. Patients with any injury on road without involvement of a vehicle, that is, person slipping and falling on the road and sustaining injury; any injury involving a stationary vehicle, that is, person getting injured while washing or loading a vehicle; and deaths due to RTA were excluded from the study. The victims reporting to the outpatient department and admitted in the inpatient department were interviewed in the respective surgical or orthopedic wards. In case of victim who was not in a condition to be interviewed, attendants were interviewed who had either seen the accident happening or had visited the site of accident afterward and had full knowledge of accident happening through the police enquiry.

The data regarding the sociodemographic factors, antecedent factors, and vehicular factors responsible for RTAs were collected in predesigned and pretested pro forma. Besides, information regarding first aid was also obtained. The data so obtained were compiled and analyzed using SPSS-16. Statistical analysis was carried out using χ^2 -test with $p < 0.05$ was considered as the significant value. The results were interpreted to make suitable recommendation.

Results

Demographic data revealed that 87% of the victims of road accidents were males. The majority of victims were in the age group less than 50 years (426, 85.2%) and that too in the age group of 11–50 years, that is, 405 (81%). About 70.2% of

the victims were under 40 years. In all the age groups, males were the predominant victims.

Table 1 shows distribution of cases according to their occupation. Maximum 156 (31.2%) number of cases were unskilled workers and laborers. The next major groups of victims were doing service 82 (16.4%) followed by students 60 (12%), farmers (agriculturist) 49 (9.8%), businessmen 42 (8.4%), housewives 32 (6.4%), professional drivers 24 (4.8%), retired persons 24 (4.8%), skilled workers 23 (4.6%), unemployed adults 2 (0.4%), and preschool children 2 (0.4%).

Table 2 reveals that of the 500 victims of RTAs, 88 (17.6%) had monthly per capita income from all the sources less than 500, 150 (30%) had 500–1499, 129 (25.8%) had 1500–2999, 107 (21.4%) had 3000–4999, 26 (5.2%) had 5000–9999, and none of the victims had per capita income more than 10,000. The majority of the victims 367 (73.4%) had monthly per capita income less than 3000 rupees.

Table 3 shows that 167 (33.4%) of road accident victims were illiterate and 333 (66.6%) were literate. Among the literates, 162 (32.4%) were having education up to primary standard, 81 (32.4%) were up to matriculation, and 90 (18%) were higher than matriculation. The majority of the victims were literate. As they constitute the major proportion of road users in Punjab and also they have more needs and better means of transport; hence more chances of getting involved in the road accidents.

Table 4 shows that the majority of the victims 233 (46.6%) were drivers and majority of the drivers were males. The next major groups involved were the pedestrians 107 (21.4%) followed by passengers 98 (19.6%) and others 62 (12.4%). Others included the bicyclist, occupants of cycle rickshaw or animal-driven vehicles, and rehire occupants. Statistical analysis showed results that were highly significant with $p < 0.001$.

Table 5 shows the profile of the injured drivers. Of 233 drivers, 17 (7.29%) were professional drivers (i.e., driving was their profession or driving the governmental or commercial vehicles) and 216 (92.71%) were nonprofessional drivers. Of the total 233 drivers, 185 (79.40%) had driving license and 48 (20.6%) had no driving license. Of 233 drivers, three met with an accident when they were to use their mobile phone, while getting the mobile phone out of their pocket, they lost the balance. Eighteen drivers (7.72%) were on the road whole night or were driving the vehicle without having slept at night or were fatigued.

Table 6 shows the behavior of pedestrians when they met with an accident. Of 107 pedestrians, only 12 (11.21%) were walking on the footpath while majority of the pedestrians were walking on the road 95 (88.79%), 22 (20.56%) were in intoxicated state, 8 (7.48%) were under stress or anxiety, and 25 (28.36%) were walking on the wrong side.

Table 7 shows that 190 (38%) accidents happened at roads that were of single lane and 310 (62%) on two or more lane roads.

Table 8 reveals the time gap between the accident and receipt of first aid. The majority of the victims 215 (43%) reached the health facility within 1 h. In 184 (36.8%) cases, the time gap was 1–2 h, in 53 (10.6%) cases 2–3 h, in 4 cases

Table 1: Distribution of victims (according to occupation)

| Occupation | Male | Female | Total |
|-------------------------------|------------|-----------|------------|
| | N (%) | N (%) | N (%) |
| Preschool children | 2 (0.4) | — | 2 (0.4) |
| Unemployed | 2 (0.4) | — | 2 (0.4) |
| Service | 68 (13.6) | 14 (2.8) | 82 (16.4) |
| Business | 42 (8.4) | — | 42 (8.4) |
| Unskilled worker and laborers | 153 (30.6) | 3 (0.6) | 156 (31.2) |
| Skilled workers | 23 (4.6) | — | 23 (4.6) |
| Retired | 24 (4.8) | — | 24 (4.8) |
| Student | 50 (10.0) | 10 (2.0) | 60 (12.0) |
| Housewives | — | 32 (6.4) | 32 (6.4) |
| Professional driver | 24 (4.8) | — | 24 (4.8) |
| Farmer (agriculturist) | 46 (9.2) | 3 (0.6) | 49 (9.8) |
| Any other ^a | — | 4 (0.8) | 4 (0.8) |
| Total | 434 (86.8) | 66 (13.2) | 500 (100) |

^aProfessionals and part-time workers (being small group).

Table 2: Distribution of victims of road traffic accidents according to per capita income (economic status)

| Per capita income (INR) | Male | Female | Total |
|-------------------------|------------|-----------|------------|
| | N (%) | N (%) | N (%) |
| Less than 500 | 52 (10.4) | 36 (7.2) | 88 (17.6) |
| 500–1499 | 143 (28.6) | 7 (1.41) | 150 (30.0) |
| 1500–2999 | 123 (24.6) | 6 (1.2) | 129 (25.8) |
| 3000–4999 | 93 (18.6) | 14 (2.8) | 107 (21.4) |
| 5000–9999 | 23 (4.6) | 3 (0.6) | 26 (5.2) |
| 10,000 & above | — | — | — |
| Total | 434 (86.8) | 66 (13.2) | 500 (100) |

Table 3: Distribution of victims according to educational status ($n = 500$)

| Educational status | N (%) |
|---------------------|------------|
| Illiterate | 167 (33.4) |
| Literate | |
| Primary | 162 (32.4) |
| Matriculation | 81 (16.2) |
| Above matriculation | 90 (18.0) |

Table 4: Status (category) of road user

| Identity | Male | Female | Total |
|------------------------|------------|-----------|------------|
| | N (%) | N (%) | N (%) |
| Driver | 222 (44.4) | 11 (2.2) | 233 (46.6) |
| Passenger | 64 (12.8) | 34 (6.8) | 98 (19.6) |
| Pedestrian | 86 (17.2) | 21 (4.2) | 107 (21.4) |
| Any other ^a | 62 (12.4) | — | 62 (12.4) |
| Total | 434 (86.8) | 66 (13.2) | 500 (100) |

^aBicyclist, occupants of cycle rickshaw or animal-driven vehicles. and rehired occupants.

Table 5: Profile of the injured persons who were driving the vehicle ($n = 233$)

| Details | Yes | No |
|----------------------------|------------|-------------|
| | N (%) | N (%) |
| Professional | 17 (7.29) | 216 (92.71) |
| License holder | 185 (79.4) | 48 (20.6) |
| Using mobile phone | 3 (1.29) | 230 (98.71) |
| Sleepless driving/fatigued | 18 (7.2) | 215 (92.28) |

Table 6: Details of the injured pedestrians ($n = 107$)

| Details | Yes | | No |
|-----------------------------|------------|-------|------------|
| | N (%) | %age | N (%) |
| Walking on footpath | 12 (11.21) | 11.21 | 95 (88.79) |
| Accompanying any person | 37 (34.58) | 34.58 | 70 (65.42) |
| Crossing the road | 71 (66.36) | 66.36 | 36 (33.64) |
| Stationary | 9 (8.41) | 8.41 | 98 (91.59) |
| Intoxicated | 22 (20.56) | 20.56 | 85 (79.44) |
| Under stress or anxiety | 8 (7.48) | 7.48 | 99 (92.52) |
| On correct side of the road | 82 (76.64) | 76.64 | 25 (23.36) |

3–4 h, in another 4 cases 4–5 h, in 14 cases 5–6 h, and in 26 (5.2%) cases it was more than 6 h.

Discussion

RTAs are mainly caused by the rapid increase in personalized modes of transport (agent), lack of road discipline, and improper roadway features (environment).^[5]

As a public health problem, road accidents are amenable to treatment by the methodology applied to epidemic disease,

Table 7: The road and traffic conditions as informed by the victims

| Characteristics | N (%) |
|--|-------------|
| Road lanes | |
| Single | 190 (38) |
| Double or more | 310 (62) |
| Total | 500 (100) |
| Traffic direction | |
| One way | 15 (3) |
| Two way | 485 (97) |
| Total | 500 (100) |
| Lighting condition on | |
| The road (in accidents that occurred at night) | |
| No or poor/inadequate | 100 (68.03) |
| Yes (adequate) | 47 (31.97) |
| Total | 147 (100) |

Table 8: Time interval between accident and first aid (*n* = 500)

| Time interval (h) | N (%) |
|-------------------|------------|
| 1 | 215 (43) |
| 1–2 | 184 (36.8) |
| 2–3 | 53 (10.6) |
| 3–4 | 4 (0.8) |
| 4–5 | 4 (0.8) |
| 5–6 | 14 (2.8) |
| >6 | 26 (5.2) |

including the detailed investigation of individual incidents and the application of epidemiological techniques.

In this study, it was observed that the majority of the cases were in the age group of 21–30 years. More number of cases were in this age group and can be explained on the basis that this is the most active period of life with tendency to take risks and also the carefree attitude of the younger population. In this study, the majority of the victims were literate. As literate people constitute the major proportion of road users in Punjab and also they have more needs and better means of transport; hence, more chances of getting involved in the road accidents. Mehta^[6] in 1968 also observed that major proportion of road accident victims were literate. In a study conducted at JIPMER Hospital, Pondicherry, India,^[7] it was found that 107 (21.4%) had education up to fifth class, 95 (19.3%) had education up to eighth class, and 82 (16.6%) were illiterate and victims with higher education were fewer in proportion.

The majority of the victims involved (unskilled workers and laborers, servicemen, and students) were those persons who make the bulk of the crowd as they have to move out of and come back to their houses for their daily work, office, or school. Unskilled workers, farmers, and laborers are mostly unaware of the traffic rules; the servicemen mostly in hurry to reach the office in time; and students have carefree attitude. The study conducted at NIMHANS by Gururaj *et al.*^[8] found that professionals constituted 2.6% of the victims, semiskilled 7.4%,

unskilled 10.1%, students 13.6%, semiprofessionals 15.9%, and skilled group 19.8% of the victims. In a study conducted at JIPMER hospital,^[7] it was noticed that laborers were the highest (29.9%), followed by 157 (21.6%) employee in service and 115 (15.8%) students. Singh *et al.*^[9] in 1993 reported the involvement of laborers was up to 20%, people doing private jobs 24%, and agriculturist 19.5%, students 14%, housewives 6.5%, businessmen 4%, and government employees 5.5%.

This study showed that the majority of the victims, 367 (73.4%), had monthly per capita income less than 3000 rupees. This is because the majority of the patients coming to government hospital are from low- or middle-class families. People belonging to high class prefer private hospitals. Second, the people from lower class mostly have two-wheeled vehicles, which are more prone to accidents, and also lower educational status with less awareness of traffic rules.

It was found that the majority of the victims 233 (46.6%) were drivers and majority of the drivers were males followed by pedestrians comprised 107 (21.4%) victims. In the study, Singh *et al.*^[9] observed that 50.5% of the victims were drivers followed by 29.5% passengers and 20% pedestrians.

This shows that drivers are more at the risk of accidents. Zhou *et al.*^[10] in 2003 observed the involvement of pedestrians in 59.1% of the victims in his study, followed by people above the age of 60 years (24.1%). According to the study conducted by Gururaj *et al.*,^[8] 26% of the victims were pedestrians, 31% of them were two-wheeler riders, 12% of them were two-wheeler pillions, 8% of them were bicycle users, and 5% were passengers; this shows that pedestrians, cyclists, and two-wheeler users were vulnerable road users and need to take extra precautions when on road. The study conducted at JIPMER Pondicherry,^[7] revealed similar results: pedestrians (22%), drivers (35%), and occupants of vehicles (45%) were the category of road users among the victims. According to the community-based study conducted by Pramod and Tewari^[11] in Delhi, the majority of the victims were two-wheeler users (46.3%) and pedestrians (24.9%) followed by cycle users (14.1%).

This study shows that nonprofessional drivers were more at the risk of accidents, which could be explained on the basis that the number of nonprofessional drivers driving on the roads was much more than the professional drivers. Second, very few owners of the private vehicles take formal training for driving the vehicle. A considerable number of people was driving the vehicles on road without license, which reflects lack of appropriate discipline and checking by the traffic police. Also, while issuing the driving license there is no checking by the authorities. Viren *et al.*^[12] have found that less than 40% of the cases had driving license. McCart *et al.*^[13] in 2000 observed that 47.1% drivers fall asleep at the wheel of truck. Singh *et al.*^[9] observed that 7% of the drivers were untrained, 15% road users were fatigued, and 17% of the road users were under some sort of stress.

The pedestrians on the road are more vulnerable to accidents than those on the footpath. Thirty-seven (34.58%) pedestrians were crossing the road either at intersection or

on the midway of the road. This is because the road users are not in habit of obeying the traffic rules and walking on the footpath. Also, all the roads are not provided with the footpath. Thus a majority of the pedestrians met with an accident when they were crossing the road. Again this might be due to their unawareness while walking on the road and nonobservance of traffic rules. Nine pedestrian were just standing and not moving while 98 were in motion when they met with an accident. Some were in intoxicated state, under stress or anxiety, or walking on the wrong side, when accident occurred. All these behaviors increase the chances of accidents on the road. In the study conducted by Gururaj *et al.*,^[8] most of the pedestrian injuries occurred in the middle of the road (78.2%) while crossing the road.

This study found that higher accident rate on two or more lane roads might be due to the running of heavy vehicles especially on highways in addition to the other vehicles on these roads and also the higher speed of vehicles and more density of traffic on these roads. Only 15 (3%) accidents occurred on the roads where traffic was one way and 485 (97%) on the roads with two-way moving traffic. This was because of smooth and better regulated traffic on one-way roads. Also, the numbers of roads with one-way traffic are less as compared to two-way traffic accounting for more accidents on roads with two-way traffic. Further on exploration of lighting condition on roads in accidents that occurred during night hours; it was found that there was adequate light arrangement in 47 (31.97%) cases only, whereas the majority of the cases (100, 68.03%) reported inadequate or no lights on the roads. The inadequate lighting arrangement on roads definitely increases the chances of accidents. This also reflects the ignorance on the part of administration and management and maintenance concerned with such lighting arrangement on the roads. Baker *et al.*^[14] also reported that the roads play a major part in the occurrence of accidents and the severity of injuries. The road's gradient, curvature, lane width, lighting, signs and signals, ditches, and fixed objects near the roadways all contribute to the likelihood and severity of crashes.

In this study, however, many cases (43%) were able to get the first aid within an hour but the delay in other cases was due to loss of much precious time in getting help from the passersby or the vehicle owner. In many cases, the victims were brought by the police as none of the passerby bothered to help the accident victim. In certain cases, the unavailability of comfortable mode of transport to reach the hospital caused the delay, whereas in other cases it was indecisiveness on the part of victims or their attendants regarding the hospital where victim should be admitted. Similarly, in a study conducted by Gururaj *et al.*,^[8] it was found 12% of victims reached a definitive hospital in less than 1 h and 30% in 1–3 h. Regardless of how simple or sophisticated a given prehospital trauma care system might be, certain elements are essential to decrease preventable morbidity and mortality.^[15]

Within the limitation of this study, due to referral of cases to other institutions, some patients getting themselves discharged against medical advice, and resource (time, single

investigator) constraints not all victims could be interviewed, and moreover, as information is based entirely on the data collected from the victims, it may not be corroborative with actual facts regarding road traffic injury causation, it can be drawn that drivers constitutes the major victims followed by pedestrians. Majority of the pedestrians met with an accident when they were crossing the road followed by victims under intoxication or under some sort of stress or anxiety.

Conclusion

The tragedy of RTAs is that they particularly involve young, perhaps the young and adventurous. Males aged 15–30 years are especially involved; fatal accidents in this group represent not only tragic family loss but also a serious economic loss to the community, as their education and training have been wasted. All road users are concerned in the prevention of accidents, but attention must focus especially on drivers of motor vehicles, because they may endanger the lives of road users as well as their own. One should realize that driving is a privilege and not an inherent right, a privilege that can and should be withdrawn if it is shown that it may endanger others.

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