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Original Article

An epidemiological study of road traffic accident cases admitted in a tertiary care hospital

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ABSTRACT

Background: Road traffic accidents are a leading cause of mortality and morbidity globally. In India, more than a million are injured annually and about a lakh are killed in road traffic accidents.¹ It causes the country to lose around 55,000 crores annually which is 2–3% of Gross Domestic Production (GDP).² This cross sectional study was conducted to elucidate the role of various factors involved in road traffic accidents.

Methods: Road traffic accident cases admitted to a tertiary care hospital between 01 Oct 2009 and 28 Feb 2011 were included in the study. A total of 182 patients were studied. Information was collected through questionnaire, hospital records and on-site visit. OPD cases, comatose patients and deaths were excluded.

Results: Two-wheelers were the commonest vehicle involved in vehicular accidents. Most accidents happened at a speed of 40–60 km/h (37.9%). Most of the patients were aged between 20 and 30 years. Majority had a driving experience of less than 5 years. Monsoons witnessed 46.7% cases. Most cases occurred between 6 and 10 pm. Among severe injuries, the commonest was lower limb fractures (19.8%).

Conclusion: There are multiple factors associated with road traffic accidents which due to the lack of road safety measures in the country are playing their role. It is the need of the hour to address this issue and formulate comprehensive, scientific and practical rules and regulations as well as evaluate its enforcement.

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Introduction

Road traffic accidents are one of the leading causes of morbidity and mortality worldwide, accounting for over one million deaths per year.¹ Road traffic accidents are defined as

a collision involving at least one vehicle in motion on a public or private road that results in at least one person being injured or killed.² They also have a huge impact on disability-adjusted life years (DALYs). It has been predicted that by 2020 global death rates from road traffic accidents will rise by 67% due to

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the effect of rapid population growth, industrialisation and an increase in road vehicles. The World Health Organisation predicts that road traffic injuries would become the sixth commonest cause of death by the year 2020 and the fifth by 2030.²

This increasing morbidity and mortality rate, particularly in those of working age group, has devastating consequences for the economic growth of countries. Of the worldwide annual average of 700,000 road accidents, 10% occur in India. Over 100,000 people are killed on Indian roads annually. By 2020 it is estimated that road traffic accidents would have its fatal effect on about 55,0000 people annually.³

In view of the above, this study was conducted with the aim to study the factors involved in road traffic accidents as well as elucidate the pattern of injuries sustained.

Materials and method

A cross sectional study was planned at a tertiary care hospital between 01 Oct 2009 and 28 Feb 2011. Road traffic accident cases which got admitted during this period were consecutively enrolled in the study after an informed consent.

Information was collected through a pre-tested questionnaire, perusal of hospital records and visit to the accident area to assess the nature of turnings, road conditions, sign boards, etc for corroborative evidence. Comatose cases, OPD cases and fatalities were excluded from the study. A total of 182 patients were studied. A limitation of this study was the exclusion of deaths and comatose cases which had to be done because it was difficult to obtain from relatives/eye-witnesses, the exact factors which were operating during the accident as mentioned in the questionnaire. Incorrect information rendered by patients on drug/alcohol or helmet use due to fear of punitive action can be a problem in such studies but the patients were taken into confidence for giving the correct information and the same cross-checked from hospital records.

Results

The commonest age group involved in accidents was 20–30 years (34.62%). 84.6% of patients were males and 61% of patients were married. 67% of patients were driving the vehicle when the accident happened. 14.3% patients were pedestrians. Analysis of the drivers ($n = 122$) met with the accident was done on basis of their driving experience. Maximum drivers (9.8%) were having less than 1-year experience followed by 6.5% drivers who had experience between 1 and 2 years. Table 1 reflects the frequency against driving experience based on a class interval of 5 years (instead of 1 year grouping to avoid the table from becoming lengthy). Maximum drivers had an experience of less than 5 years (27.35%). 22.96% drivers admitted that they were not alert when the accident happened. Amongst users of two-wheelers (drivers and pillion; $n = 143$), 64.33% claimed that they were wearing headgear during the accident. The commonest explanation for not using a headgear was its negligence due to overconfidence on driving abilities.

Table 1 – Distribution of patients according to their driving experience.

Driving since	Frequency (n)	Percentage (%)
Less than 5 years	34 ^a	27.35
5–10 years	29	22.31
10–15 years	14	10.79
15–20 years	9	7.19
20–25 years	15	13.61
25–30 years	10	8.19
More than 30 years	11	9.01
Total drivers	122	

^a A majority (12 drivers) were having less than 1-year experience in this particular group.

Motorised two-wheeler was the commonest vehicle involved (71.9%) in the accident (Fig. 1). Pedestrians included the next commonest category (14.8%). In 42.3% cases, there was no second vehicle involved i.e. the accident happened due to the skidding of the patient's vehicle, losing of its balance, crashing with a divider/tree, etc. In 105 cases, a second vehicle was involved and 64.76% of them were sideways collision. The other vehicles in these 105 cases were mostly four-wheelers. 37.9% patients suffered the accident while travelling at a speed between 40 and 60 km/h (Fig. 2). A total 29.67% cases occurred in Jul–Aug. Maximum cases (46.7%) took place during monsoons (Jul–Oct). Sundays witnessed the maximum cases (19.2%). Majority of cases (43.7%) occurred between 6 pm–10 pm (Fig. 3). 68.1% accidents occurred on smooth roads.

The time taken by majority of patients to receive the first medical aid was found to be between 30 and 60 min (39.6% patients). 32.3% patients received the first aid treatment after more than an hour. Soft tissue injuries were the commonest type of injuries suffered (48.6%). Among the more severe injuries, lower limb fractures were the most common (19.8%). Based on Abbreviated Injury Scale system, 71.9% patients sustained severe injuries.

There was a significant association between the mode of travel and severity of injuries with higher odds of severe

Fig. 1 – Patient's vehicle at the time of accident.

Fig. 2 – Speed of patient's vehicle at the time of accident.
*The 26 pedestrians have been excluded in this data.

injuries in those who were on motorised two-wheelers ($\chi^2 = 8.81$, d.f. = 1, p value < 0.05, OR = 2.77). A significant association between the speed of vehicle and severity of injuries was found ($\chi^2 = 4$, d.f. = 1, p value < 0.05, OR = 1.37). Patients travelling at more than 40 km/h had higher odds of sustaining a severe injury. There was a significant association between use of headgear and head injuries ($\chi^2 = 30.28$, d.f. = 1, p value < 0.05, OR = 0.1). There were higher odds for sustaining head injuries by the people who did not wear a headgear. Use of headgear was found to be protective.

Discussion

The most common age group involved was between 20–30 years followed by 30–40 years. Similar results were found in studies conducted in Delhi by Mehta and in Nepal by Jha.^{4,5} This may be attributed to the fact that this is the age group which ventures out most due to studies or employment and also has a tendency to overspeed. According to National Crime Records Bureau, Delhi, maximum numbers of cases were between the age group 15–44 years.

Fig. 3 – Cases as per the time of occurrence.

The males affected were 5.7 times than that of the number of females. This can be attributed to the fact that in the settings of our country, it is the male that is more involved in outdoor activities. According to a study by Sathiyasekaran BWC, 80% of patients involved in road traffic accidents were males.⁶ Most patients in our study had less than 5 years experience (27.35%). Further analysis revealed that majority were having less than 1 year experience. Gregersen and Bjurulf⁷ postulated that inexperience is a more important factor than youth and is associated with increased accidents. A higher accident risk of young novice drivers compared to older experienced drivers driving with passengers was found by Vollrath et al in Germany.⁸ In our study, a slight increase in accidents when the experience goes beyond 20 years may be due to change in reflexes and visual acuity with age or because of resorting to a different model of vehicle after certain number of years. The usage of helmets in this study (which includes non-fatal cases) was above 60% and was shown to be protective. A study by Sood revealed a lower incidence and severity of head injuries in individuals who used helmets.⁹

Motorized two-wheelers clearly outnumbered all modes of travel in this study. In a study conducted by Singh et al¹⁰ similar findings were revealed. 40–60 km/h was the commonest speed range just before the accident in this study. In a study conducted in Nepal,¹¹ vehicles speeding at 40–60 km/h were responsible for a high percentage of accidents. A study conducted by Taylor states that higher speed leads to an increased frequency of accidents.¹² In the current study, at speeds greater than 70 km/h, the frequency of cases was less since the fatal cases were not included which were more likely to be driving at higher speeds.

The high number of cases in July and August owed to the monsoon weather which causes impaired visibility and judgement problems and skidding of vehicles of which the latter has been a major cause of accidents. In a study conducted by Jha and Agrawal in Eastern Nepal,¹³ maximum accidents took place in July (14.5%). In another study conducted by Kiran et al,¹⁴ 78% of the accidents occurred in monsoons. Most accidents in this study occurred between 6 pm and 10 pm, mostly during the earlier half i.e. 6 pm–8 pm (22.7% of the cases). This can be attributed to relatively lower visibility during this period as well as increase in traffic. In a study by Kiran et al,¹⁴ maximum accidents occurred between 6 pm and 12 midnight. 5 pm–8.59 pm was the peak hour reflected in another study conducted in Mangalore.¹⁵ In another study conducted by Jha in Pondicherry,¹⁶ the peak time observed was between 4–5 pm and 6–7 pm. The slight difference in timings as compared to our study can be due to difference in work culture (and hence peak hours) of the two cities.

Most cases took a time between 30 and 60 min to reach the nearby health care centre which is high considering the cities involved to be well developed in terms of communication, transport and health care systems as compared to some other areas of the country. In a study conducted by Kiran et al,¹⁴ it was revealed that most cases took 1–2 h after the accident to reach a health care facility. This speaks of the poor emergency services in our country.

In cases where collision occurred with another vehicle, sideways collision was the commonest type (64.76% of collisions). This is similar to the findings of a study carried out by

Gunjan et al¹⁷ in central India where sideways collision was found to be commonest mechanism of accident found in 63.59% cases. In the present study majority of the sideways collision (36 out of 38) was due to blind turnings. It was found that at most turnings the warning sign boards were missing.

Among the serious injuries, lower limb fractures were the commonest followed by head injuries which is in concordance with a study carried out in western Maharashtra.¹⁸ Similar findings were revealed in a study carried out by Gichuhi in Nairobi¹⁹ as well as in a study carried out by Gunjan et al¹⁷ in central India.

The most severe injuries suffering category was that of “occupants of motorised two-wheelers”. This is explained by the fact that motorised two-wheelers have triple risk. Firstly they are uncovered; secondly they are relatively unstable and thirdly there is a tendency to ride them at higher speeds. This all amounts to an impact of greater mechanical energy during the accident which leads to injuries that most of the times are severe. Headgear had a protective effect on head injuries. There was a significant association between the speed of travel and the severity of injury. This is in concurrence with a study carried out on students of college in Taiwan where it was concluded that an increased riding speed was significantly associated with a greater level of injury severity.²⁰

Conclusion

It is evident that multiple factors are involved in road traffic accidents. There is a need of more scientific studies on the subject and road users need to be educated on factors involved in the road accidents. Speed has been shown to be associated with severity of injuries in the study and the same hence demands intervention in a multipronged manner. Emergency care system has to undergo serious reforms. The study shows lack in immediate care to the injured. When factors like poor visibility, monsoons, road conditions, absent sign boards, peak hours play a part, drivers need to be extra careful. Many patients claimed not to be alert when accident happened. Poor road engineering accentuates the above factors.

Scientific evidence from high income countries exists for the effectiveness of interventions such as helmet use, preventing drinking and driving,²¹ speed control,²² safety belts,²³ trauma care, road engineering, use of signages and child safety seats.²⁴ Recently, data has emerged from low and middle income countries as well. Implementation of these measures in a multipronged strategy is the need of hour.

Conflicts of interest

All authors have none to declare.

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