

Original Article

Pattern of Morbidity and Mortality due to Road Traffic Accident at College of Medical Sciences, Chitwan, Nepal

AU Pokhrel, A Acharya, A Yadav
Department of Community Medicine
Nobel Medical College Teaching Hospital, Biratnagar, Nepal

Abstract

Background: Road traffic accident (RTA) which is recognized as a public health problem is one of the fastest growing epidemics in the South-East Asian Region. Every hour, 40 people in the region die as a result of collision.

Objectives: To estimate the morbidity and mortality of RTA victims and also to assess the pattern of the RTAs at College of Medical Sciences Teaching Hospital, Bharatpur, Chitwan.

Methods: This was a cross-sectional study including 100 RTA victims who attended College of Medical Sciences Teaching Hospital, Bharatpur during 2013.

Results: Majority of RTA victims were male (76%) and in the age group between 20 and 39 years (48%). Maximum numbers of accidents occurred between 12 noon to 12 midnight (79%). More accident occurred on Friday (23%). Most of the RTAs occurred on motor bike (42.0%) and the most common nature of accident was through collision of the vehicle and fall/slide of moving vehicle (56.0%). Abrasion was the most common injury occurred during the RTA (91%). Almost two-thirds of the victims had laceration, nearly half had swelling and 26% had fractures. Four percentages of victims had fatality. Bad condition of road (37.0%) and speedy driving (23.0%) were the leading causes of RTA. There were 15.0% of victims who were under the influence of alcohol in RTA.

Conclusion: There was high number of male victims with motorbike as the major contributor. Abrasion, laceration and fatality were found. Bad condition of road, speed driving and alcohol habit during driving were found to be the leading causes of RTA.

Keywords: morbidity, mortality, road traffic accident, Nepal

Introduction

An accident has been defined as “an unexpected, unplanned occurrence which may involve injury”.¹ WHO Advisory Group in 1956 defined accident as “unpremeditated event resulting in recognizable damage”. An accident is the occurrence in a sequence of events which usually produces unintended injury, death or property damage. Accidents represent an epidemic of non-communicable disease. Accidents have their own natural history and follow the same epidemiological pattern as any other disease— the agent, the host and the environment. Human, vehicles and environmental factors play roles before, during

and after a trauma event.

They occur more frequently in certain age-groups, at certain times and at certain localities. Some people are more prone to accidents due their risk behaviors, like: alcohol and drugs as well as their physiological and psychological states. However, the most of accidents is preventable.¹

Over 1.2 million people die each year on the roads and between 20 and 50 million suffer non-fatal injuries. In most regions of the world, between 20 and 50 million suffer non-fatal injuries in this epidemic of road traffic accident and the injuries are still increasing. Low-income and middle-income countries have higher road traffic fatality rates (21.5 and 19.5 per 100,000

Address for correspondence

Dr. Ava Upadhyay Pokhrel
Department of Community Medicine
Nobel Medical College Teaching Hospital Biratnagar
Email: avapokhrel01@hotmail.com

populations respectively) than high-income countries (10.3 per 100,000 populations). Over 90% of the world's fatalities on the roads occur in low-income and middle-income countries, which have only 48% of the world's registered vehicles. Death rates have been declining over the last four to five decades in many high income countries; however, road traffic injuries remain an important cause of death, injury and disability.¹ WHO predicts that road traffic injury will increase from being the 9th leading cause of death in 2004 to 5th leading cause in 2030. Hence, it has been recognized as public health problem.²

Road traffic accidents are one of the fastest growing epidemics in the South-East Asian Region. Every hour, 40 people in the region die as a result of collision. It is estimated that 306,000 people were killed on roads in South-East Asia in 2004.³ Road traffic injuries kill over a million people annually, 90% of whom live in low and middle income countries. The problem in under-developed and developing country is expected to be worsening in coming decades because the burden of traffic casualties rises in the early stages of economic development with increased motorization.⁴ However, wealthy countries in advanced stages of development have been able to control the number of fatal crashes through a variety of counter measures; including: occupant protection, better roads, effective trauma care systems and the enforcement of traffic laws. To reduce the burden of accidents, low income countries can also implement some of these interventions to control traffic casualties without passively waiting for economic prosperity to propel investments in safer vehicles, roads and drivers.

Nepal is not an exception among Asian developing countries. A report of WHO mentions that in 2007, RTA fatalities were 962 and 2653 were the total non-fatal RTA cases in Nepal. The RTA cases are steadily rising from 2003.³ The cases were found to be in younger age group in Nepal and India. A hospital based study shows a highest number of RTA victims (31%) were in the age group of 20 to 29 years.

The number of vehicle is increasing day by day in Nepal, but the number road is same. Moreover, the condition of roads is worsening with each passing days and not timely maintained. Since the number of literature regarding epidemiology of RTA is less in context of Nepal, the present study has been conducted with the objective to estimate the morbidity and mortality of RTA victims and also to assess the pattern of the RTAs at College of Medical Science Teaching Hospital, Bharatpur, Chitwan.

Methodology

This cross-sectional study was carried out during 2013 at teaching hospital of College of Medical Sciences, Bharatpur among the victims of RTAs. The sample size was calculated based on a research done at B. P. Koirala Institute of Health Sciences, Dharan⁵ which shows that among 124 RTA victims within a year, 62.1% had head injuries. Taking proportion, $p = 62.1\%$, $q = 37.9\%$ and permissible error of 16%. Using formula, $n = Z^2 \times p \times q / L^2 = (1.96)^2 \times 62.1 \times 37.9 / (9.94)^2$

the sample size was calculated as 91.5 which is around 92. Then, adding 10% for non-response rate, it came to be 101.2 which is almost 102 victims. The 100 victims included in this study had 98.03% response rate.

The RTA case was defined as an accident which took place on the road between two or more vehicles plus vehicle overturning, sliding or falling from road, hitting stationary object or moving vehicle, animals and people. The consecutive cases of RTA brought to teaching hospital of College of Medical Sciences, Bharatpur were enrolled into study. Those injury on the road without involvement of vehicle i.e. a person slipping and falling on the road and sustaining injury or injury involving stationary vehicle i.e. person getting injured while washing or loading a vehicle was excluded in the study.

A questionnaire was prepared in English and translated into Nepali language by an expert and back translated to English by another expert. The two English versions were compared for

homogeneity and language errors were corrected. The pretest of the questionnaire was done among 10 cases. The necessary correction was made in questions to make them simple and easily comprehensible.

The data was entered into Microsoft Excel 2007 and analyzed in SPSS 17.0. Frequency and percentage were calculated for numerical presentation and graphical presentations were made using bar diagram and pie chart. Cross tables were formed and Chi-square test was used to find out the association between variables. P value was set at 5% level.

The study was approved by Institutional Review Committee (IRC) of College of Medical Sciences, Bharatpur, Chitawan. The permission was obtained from the institution. The consent

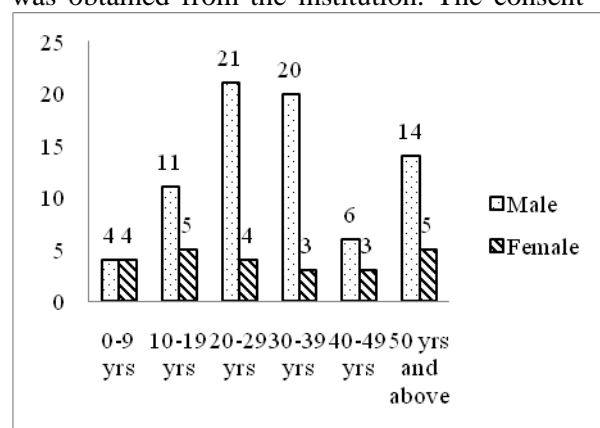


Figure 1: Age and Gender distribution of RTA victims at teaching hospital of College of Medical Sciences, Bharatpur

More than one third of RTA victims had higher secondary school and above education (35%). Nineteen percentages were illiterate. The remaining was primary to secondary school education (37%), except 6% of pre-schooling children and 3% of unknown education. Most of the participants were school students (29%) followed by 28% of agriculture workers, 15% of laborers, and 12% of businessmen.

was taken from each victim or care taker after informing. They were also provided assurance of anonymity and confidentiality of data. Any individual who did not agree to participate, were excluded from the study.

Results

Socio-demographic variables:

Among 100 victims of RTAs, 76% were male and almost half (48%) were between 20 and 39 years. In each 10 year age interval of RTA victims' age, more number of victims were males. There was no significant difference of gender according to age interval in the study ($\chi^2= 6.33, P= 0.176$). The age and gender distribution of RTA victims have been shown in figure 1.

Table 1. Demographics of RTA victims at teaching hospital of College of Medical Sciences, Bharatpur

Variables	Percentage
<i>Educational status</i>	
Illiterate	19
Primary	10
Lower secondary	11
Secondary	16
Higher secondary	23
Bachelors and above	12
Not applicable	6
Not known	3
<i>Occupation</i>	
Business	12
Agriculture	18
Service	8
Student	29
Housemaker	10
Laborers	15
Not applicable	6
Not Known	2
<i>Marital Status</i>	
Single	38
Married	48
Not applicable	13
Not known	1

Almost half of the victims were married. Thirteen percentages of victims were below than marital age. Occupation and marital status could not be known for two victims and one victim respectively (Table 1).

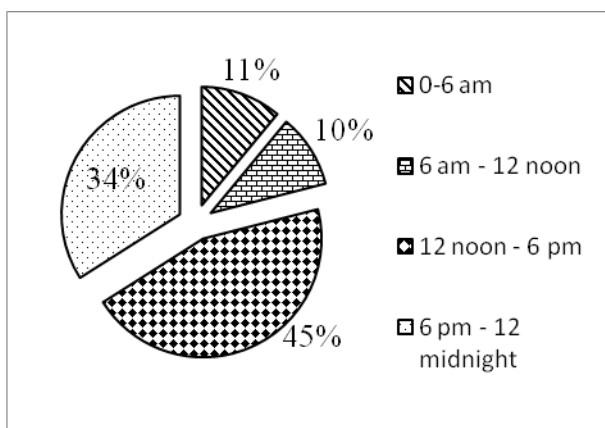


Figure 2: Timewise distribution of Road traffic accident (n= 100)

Figure 2 depicts time wise distribution of road traffic accidents where maximum number of accidents occurred between 12 noon to 6 pm, followed by 6 pm to 12 midnight.

Table 2. Day-wise distribution of RTA victims at teaching hospital of College of Medical Sciences, Bharatpur (n= 100)

Days of accident	Percentage
Sunday	6.0
Monday	12.0
Tuesday	18.0
Wednesday	13.0
Thursday	12.0
Friday	23.0
Saturday	16.0

As in table 2, maximum number of RTAs reported on Friday (23%) followed by Tuesday (18%).

Table 3. Nature of accidents and vehicles involved (n= 100)

Nature of accident	Type of Vehicles (%)											Total
	Motor bike	Scooter	Truck	Bu s	Jeep	Van	Bi- cycle	Tracto r	Car	Rick shaw	Tempo	
Hit by the vehicle	8	0	2	4	2	0	0	0	3	0	0	19
Collision of the vehicle	10	1	2	3	1	1	9	3	2	1	1	34
Fall/slide from the road	3	0	2	0	0	0	3	1	0	0	0	9
Overturning of the vehicle	0	0	0	0	0	0	0	1	0	0	5	6
Fall/slide of moving vehicle	15	0	0	0	0	0	7	0	0	0	0	22
Fall from moving vehicle	6	0	0	4	0	0	0	0	0	0	0	10
Total (%)	42	1	6	11	3	1	19	5	5	1	6	100

Table 3 showed the nature of accidents and vehicle involved. Most of the RTAs occurred on motor bike (42%), followed by bicycle (19%)

and bus (11%). The nature of accident was most common through collision of the vehicle (34%) followed by fall/slide of moving vehicle (22%) but there was no significant difference of motor bike accidents and the collision of the vehicle

($\chi^2= 0.008$, $P= 0.945$) and hit by the vehicle ($\chi^2= 3.35$, $P= 0.067$).

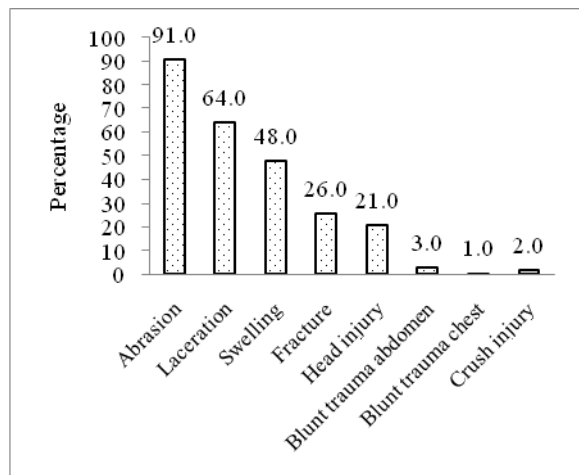


Figure 3: Percentage of type of injury among RTA victims (n= 100)

Figure 3 shows that abrasion (91%) was the most common injury occurred during the RTAs, followed by laceration (64%). Nearly half of the victims had swelling and 26% of the victims had fractures.

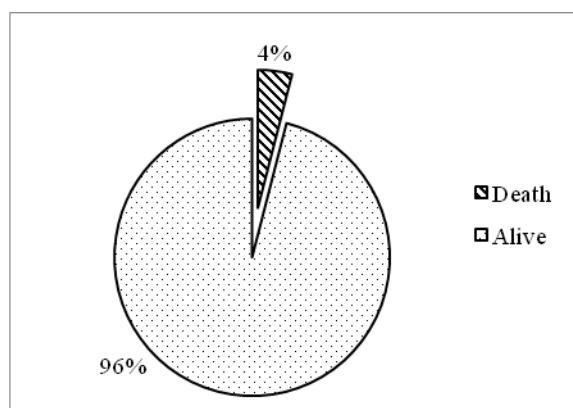


Figure 4: Death occurred during RTA at teaching hospital of College of Medical Sciences, Bharatpur (n= 100)

As in figure 4, 4% victims had fatality. Other had sustained minor to major injuries.

Table 4. Causes of RTA among victims at teaching hospital of College of Medical Sciences, Bharatpur (n= 100)

Causes of RTAs	Percentage
Personal causes	42
Alcohol intake	15
Drug intake	2
Speed	23
Exhaustion	1
Poor vision	1
Mechanical causes	3
Age of vehicle	1
Condition of vehicle	2
Environmental causes	18
Rain	1
Poor light	15
Glare	2
Road condition	51
Turning	13
Bad condition of road	37
Slippery road	1

As in table 4, road condition was a major cause (51%) for the RTA, followed by personal causes (42%). Specifically, bad condition of road (37%) and speedy driving (23%) were the leading causes of RTA. There were 15% of victims who were under the influence of alcohol in RTAs.

Discussion

The present study depicts that maximum number of accident occurred during day and night time in comparison to the morning time at Bharatpur, Chitwan. Similar type of study conducted in Delhi⁶ reports that occurrence of RTA peaked between 4 pm to 5 pm and 9 am to 10 am. In contrast to this finding, a study carried out in Hawaii among elderly aged drivers,⁷ reports that maximum number of vehicle crashes occurred during 8:00 am to 11:59 am which comprised one-third of the study samples. But our study result is supported by a study done in Dharan, eastern Nepal,⁸ which reports that maximum accidents occurred between 12 pm to 3 pm or 6 pm to 9 pm.

Similarly, injury pattern also depends upon the different days based on different locality. The

current study reports that the highest number of accidents was on Friday and Tuesday, and lowest was on Sunday, in contrast to this finding, similar type of study conducted at Dharan⁷ reports RTAs were more on Sunday and less on Mondays. Different studies^{8,9,10} report different days like Saturday, Monday and Wednesday on when most of the accidents happened.

This reflects that the time and day of injury pattern is different according to different location. Magnitude of the road traffic accidents basically depends upon the movement of the people on the road. The time and day are important based on the locality as people are more mobile during coming and going to schools, offices, factories etc.

The current study shows that most of the RTA was motor bike accidents. The most common nature of accident was through collision of the vehicle and fall/slide of moving vehicle. Road condition was a major cause for the RTA. Specifically, bad condition of road and speedy driving were the leading causes of RTA. This is consistent with the findings of the studies carried out by Nilsson G⁹ and Finch DJ¹⁰ which report that an increase in average speed is directly related to likelihood of a crash occurring and to the severity of the crash consequence. Another study¹¹ adds that a 5% increase in average speed leads to an approximately 10% increase in crashes that causes injuries.

Also this study depicts that there were 15% of victims who were under the influence of alcohol in RTA. The speed of vehicle is also influenced by the drinking habit of drivers. A WHO report mentioned that drinking and driving increase both the risk of crash and the likelihood that death or serious injury will occur.¹² There are traffic rules and regulation in Nepal for speed limit of driving. There is no mechanism of checking the speed limit. However, some efforts have been made by the traffic police in Nepal. There is surprise checking of alcohol consumption and valid license of the riders time to time where many of motor bike riders pays

penalty for not following traffic rules. But the supervision needs to be continued regularly to control road traffic accidents in Nepal. At the same time, there should be awareness program for the riders of vulnerable areas where accident occurs frequently.

The pattern of mortality and morbidity in the low and middle countries is changing from infectious diseases to non-communicable disease as well as injuries and violence. Due to increase of population along with modern life-style, the number of vehicle is also increasing day by day. Unfortunately, the number of motor-able roads could not be proportionately constructed in Nepal due to poor economic condition. In addition, the available roads are old and also not timely maintained as result of which condition of roads is worsening day by day. These are the possible reasons of increasing road traffic accidents in Nepal.

We cannot completely stop RTA, but we can certainly reduce the frequency of RTA by taking preventive steps such as obeying strict traffic rules, improving the condition of roads, regular checking of vehicle condition and providing the awareness for the public.

In our study, we found abrasion to be the most common injury occurred during the RTA. Almost two-third of the victims had laceration. Nearly half of the victims had swelling and 26% of the victims had fractures. There were 4 percentages of fatal cases during the enrollment of samples through consecutive cases. The lower proportion of mortality may be because most of the fatal death did not reach to College of Medical Science Teaching Hospital, Bharatpur, Chitwan. The WHO estimates that every day around the world almost 16,000 people die from injuries and violence, and that is accounted for 9.8% of the world's death in 2004. In particular, injuries and violence accounted for 17% of the disease burden among adults aged 15-59 years in 2004.⁵

RTA causes many severe injuries and a large number of deaths each year and therefore, road traffic injuries are increasingly being recognized as an important public health problem. WHO

estimates also predict that road traffic injury will increase from being the 9th leading cause of death in 2004 to 5th leading cause in 2030.⁴ It is being increasingly evident that poor and vulnerable group is low-income, and middle-income countries have a disproportionate share of the burden arising from RTA.¹³ Although the epidemic of RTA in low and middle income countries is still in its early stages, it threatens to grow exponentially unless swift action is taken to counter it.¹⁴

The cost of RTA is enormous- having been estimated at US\$518 billion each year which is approximately 1 % to 1.5% of Gross Domestic Product (GDP) in low and middle income countries and 2% in high income countries. Though only one person may be involved in a RTA, the entire household can be affected financially, socially and emotionally. The impacts include direct costs, such as: medical and funeral cost as well as indirect costs, such as: loss of work time. Accident victims are often working-age adults, whose families are then left without a breadwinner or bear the added expenses of caring for a disabled family member. A study in Bangladesh found that 70% of families experienced a decline in household income and food consumption after the death of their family member in RTA.

In the current study we did not assess the cost of treatment of RTA victims which is considered as one of the limitations of our study. People with minor RTA tend to avoid visiting the hospitals and all the deaths in the roads due to RTAs may not be brought to the hospital. So, the morbidity and mortality might be lesser than the real in the present study.

Prevention of RTA is an important area that calls for the attention of policymaker from health, transportation, police and justice and is particularly cost-effective. In Nepal, several steps have been taken by the government to reduce the number of RTA but that seems to be inadequate. Besides maintaining traffic rules and regulation, traffic police of Nepal is conducting traffic week every year to educate people about traffic rules and regulation. In

cooperation with different nongovernmental organization, traffic police have set hording boards to educate people about safe traffic rules. The traffic police also constantly check public vehicles time and again whether these vehicles are over-crowded or not, bikers are wearing helmet or not during driving, drivers are under the influence of alcohol or not during driving. By doing all these, we can definitely reduce the mortality and morbidity associated with road traffic accidents.

Conclusion

There was high number of male victims with motorbike as the major contributor. Abrasion, laceration and fatality were found. Bad condition of road, speedy driving and alcohol consumption during driving were found to be the leading causes of RTA.

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