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Epidemiological Study on Road Traffic Accident Cases Reporting to a Tertiary Care Government Hospital

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Abstract
The reasons for the high burden of road traffic injuries in developing countries are growth in the numbers of motor vehicles; higher number of people killed or injured per crash in low-income countries, poor enforcement of traffic safety regulations; inadequacy of health infrastructure and poor access to health care. In Nepal as per estimates of morbidity and mortality for 1998-99, injury contributed 9% to total mortality and was the third leading cause, with road accidents occupying the eighth position in the overall ranking. This prospective study was conducted to understand the epidemiological factors that affect the road traffic accidents for a period of six months. A total of 292 road traffic accidents (RTAs) victims were reported during the study period. Twenty six per cent of the injuries occurred in the 20-29 years and 30-39 years age group with the male to female ratio of 4.7:1, where male were 72% and female were 28%.The highest 26% of these cases was in the age group of 20-29 years and 30-39 years and the average vulnerable age group was 29 years. The students constituted the largest group (28%) involved in RTAs, followed by businessman (14%). The highest number of accidents occurred on Fridays (28%) and Sundays (18%) respectively. In the present study, 14% drivers were found to have consumed alcohol prior to the accident. Motorcycle (50%) and bicycle (32%) were the most common vehicles involved in RTAs. The highest number of accidents took place in highway (40%) during evening hours (44%). Lower extremities (27%), upper extremities (25%) and head region (19%) were most common sites of injuries and upper limbs fracture was most common (16%).There is a lack of coordination between different stakeholders, departments and other agencies working in the field of injury including road traffic accidents. Therefore, there is an urgent need for the ministry of health and population to take the lead and coordinate the efforts of all agencies working for the prevention and control of road traffic accidents and injuries.

Keywords: Road, Traffic, Accidents, motor vehicle, Injury

Introduction
Throughout the world, the growth of transportation system has seen continuous. It is also one of the key elements in economics development. An increase in gross national product (GNP) is accompanied by a greater movement of people and goods and greater investment in both vehicle and transport infrastructure. In developing world, current trends in population growth, industrialization and urbanization are putting heavy pressure on the transport network in general and or road system in particular[1].

Accidents, tragically are not often due to ignorance, but are due to carelessness, thoughtlessness and over confidence. Willian Haddon (Head of Road Safety Agency in USA) has pointed out that road accidents were associated with numerous problems each of which needed to be addressed seperately [2]. Human, vehicle and environmental factors play roles before, during and after a trauma event. Accidents therefore can be studied in terms of agent, host and environmental factors and epidemiologically classified into time, place and person distribution. They occur more frequently in certain age groups, at a certain time of day and week and at certain localities. Some people are more prone to accidents than others. The growing number of deaths and injuries from RTAs are apparent only with absolute fatality and causality figures rising rapidly in majority of developing countries.

According to an estimate, there are almost 1,170,694 deaths from RTA annually in the world of which 88% mortality is from developing countries [3]. The "Study Global Burden of Diseases" undertaken by the World Health Organization (WHO), Harvard University and World Bank showed that RTAs were the world's ninth biggest cause of deaths during 1990. The study forecasts by the year 2020, RTA could move up to the third place in the table of major causes of death and disability [4]. Twenty-five percent of hospital beds world wide are occupied by RTAs survivors. In addition, for every death, there as many as 13 to 20 injured or permanently disabled. These all lead to loss of the Gross National Product of the country.

The annual cost for third world countries estimated to be at least 100 billion US dollars [3].

It is estimated that more than a quarter of injury related deaths in the world occurred in the South East Asia Region (SEAR) in 2000. Children saved today from nutritional and infectious diseases are killed and maimed by accidents and injured in hundreds of thousands tomorrow. In fact, road traffic injuries alone ranked as the number one cause of the burden of disease among those in the age group 15 to 29 years in 2000. This heavy burden at such an early age has long term implications on the quality of life and economy of the nations [5].

In Nepal as per estimates of morbidity and mortality for 1998-1999, injury contributed 9% to total mortality and was the third leading cause with road accidents occupying the eighth position in the overall ranking. Fifty eight percent of injuries were in the 15-44 years of age group with a male to female ratio of 3:1[6]. In 2005-2006, 617 death totals were reported to the traffic police stations all over Nepal with 36 per 10,000 vehicles fatality rate the same year. Nepal being one of the poor countries with Gross National Product around 5 billion spends 0.4% of the GNP from nation's resource in RTA [7]. RTAs and injuries in developing countries mostly affect pedestrians, passengers and cyclists as opposed to drivers who are involved in most of the deaths and disabilities occurring in the developed world [8]. RTAs being a major but neglected global public health problem require concerted efforts for effective and sustainable prevention. Around 85% of all global road deaths, 90% of disability adjust life year lost due to crashes and 96% of all children killed world wide as a result of RTA injuries occurring in low- income and middle income countries like Nepal and Bangladesh [9]. In Nepal annual loss from RTA amounts Rs. 594 million and Rs. 139 million in Kathmandu alone[10]. Thus realizing that RTA is a major public health problem, Nepal Health Research Council (NHCRC) categorized RTA in its priority areas. Hence, in this study, we have prospectively studied the various epidemiological, medico legal, aspects of vehicular accidents in our country making an attempt to establish various causative factors, pattern and distribution of injuries and thereby to plan successful measures.

Materials and Methods

This prospective study was conducted at Koshi Zonal Hospital for the period of six months. The study group consisted of all the road traffic accident victims reporting to Koshi Zonal Hospital casualty. In this study, 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 vehicle. Any injury on the road without involvement of a vehicle (eg. a person slipping and falling on the road and sustaining injury) or injury involving a stationary vehicle (e.g. persons getting injured while washing or loading a vehicle) or deaths due to RTA were excluded from the study.

The victims of the accidents were interviewed to obtain the information about the circumstances leading to the accident. A reliable and valid pretested proforma was used for interviewing the accident victims, either in the casualty or in the wards of Koshi Zonal Hospital. Where the condition of the victims did not warrant the interview, the relatives or attendants were interviewed. The medico legal records and case-sheets of the victims were referred for collecting additional data and where necessary for cross-checking.

Results & Discussion

Accidents tragically are not often due to ignorance but also due to carelessness, thoughtlessness and overconfidence [16]. The morbidity and mortality connected with RTA are increasing at an alarming rate throughout the world as a direct result of the rapid industrialization and increase of fast moving vehicles combined with lack of traffic sense among road users [17]. A prospective study was carried out among the RTA victims reporting to Koshi Zonal Hospital. Two hundred ninety two RTA victims were involved in the present study.

The occurrence of RTA is not distributed equally in all age groups. This study shows that equal percentage i.e. 26% of the victims were in the age group of 20-29 and 30-39 years and this finding is supported by other studies conducted by Jha etal[14], Srinivasa etal[13], Quazzi etal[15], Agrawal C.S, Jha N[11] and Dr. Singh[17]. Actually these age groups are the most active period of life as well as it includes aggressive youngsters which have tendency to take risks. Since this age group is the most productive age group of the country, RTAs' occurring in these people lead to serious economic loss to the family and Society.

It was observed that 72% cases occurred in males and 28% in female with male female ratio 4.7:1. This finding is supported by a number of studies conducted by Jha etal [14], Srinivasa etal [13], Quazzi etal[15], Agrawal C.S, Jha N[11] and Dr. singh[17]. We can draw the reasons behind this as male in our society are more active and mostly involved in outdoor activities. Female lead less active life and mostly remain indoor.

Incidents of RTAs among elderly were low due to their least mobility outside the home. It was observed that more people with lower levels of education were involved in RTAs. Also those studying in intermediate level have equal incidence of RTAs. This is due to low level of education and high risk taking behaviors among the intermediate studying adolescent age groups. Mehta [18], Jolly [19] also observed similar results. However, this relation between education and RTA may not be causal.

In this study, students constitute the largest group (28%) involved in RTAs, followed by businessman, employees, laborers in descending order and this finding is supported by Mehta[18]. as already mentioned RTAs' most common among younger age groups who are mostly students and involved in some jobs outside their home. However, in another study by Jolly [19] laborers were highest followed by students and it has been reported that more accidents were seen among low socio-economic group of people.

In the present study the highest number of accidents were on Friday (28%) followed by Sunday (18%). In Nepal, Sundays and Fridays are the first and last working days of the week: this could be the possible reason for the large number of accidents on these days. People celebrate Friday as weekend and possibly are in a hurry to go to various places to join their working places on the following Sunday (see Fig. 1). Ghosh [17] also observed the highest number of RTAs on the first working day i.e. Monday in India. Mehta [18] and Stallones [20] observe more accident cases on a weekend Saturday. These observations are similar to those of the present study. Accidents were reported on Mondays (14%), Tuesdays (10%), Wednesdays (12%), Thursdays (10%) and Saturdays (8%). The number of accidents was the lowest on Saturdays. The possible reason for this could be that Saturdays are a weekly holiday in Nepal. The other reason could be that Nepalese do not like to start their journey on a Saturday because of religious belief.

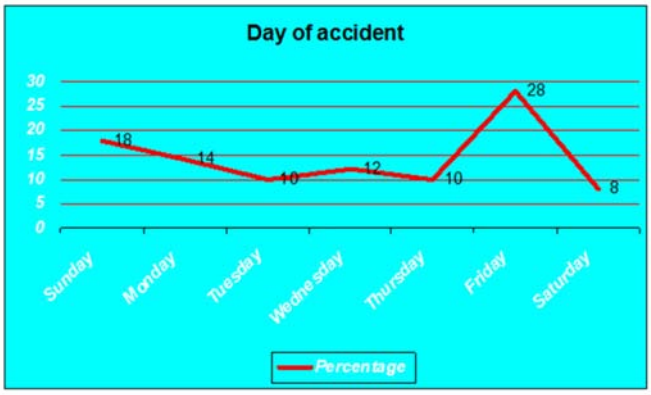

Fig. 1: Day of accident

In this study, the peak time for accidents (see Fig.2) was between 6:00 PM to 11:59 PM in the evening (44%) followed by Noon 12 PM to 5:59 PM (30%) and morning 6 AM to 11:59 AM (24%). As evening is the time for relaxation among youngsters and also busiest hours as commuters go to and return home supported by Mehta [18]. Also present study reveals that 30% of the RTAs took place in the noon hours followed by morning hours. Similar results were also observed in Delhi [21]. These times coincide with the period when people are more active and mobile.

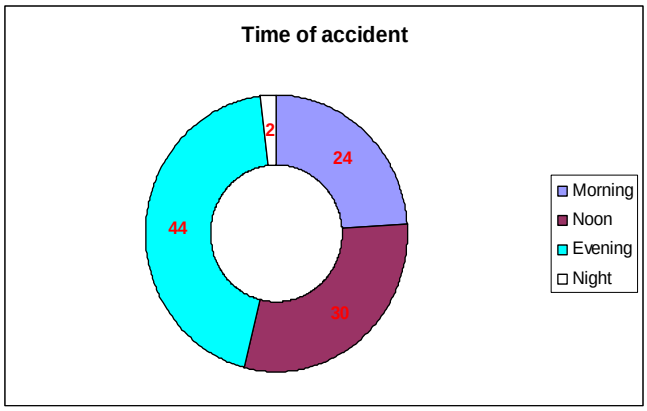

Fig. 2: Time of accident

Weather also plays an important role in the incident of RTAs (see Fig. 3). We observed maximum RTAs on wet days (66%) this might be due to the study being conducted during rainy season and also most probably due to the poor condition of roads and slippery road, the driver lose control over the vehicle. Similar finding is observed in other studies of Ghosh [17] and Mehta [18].

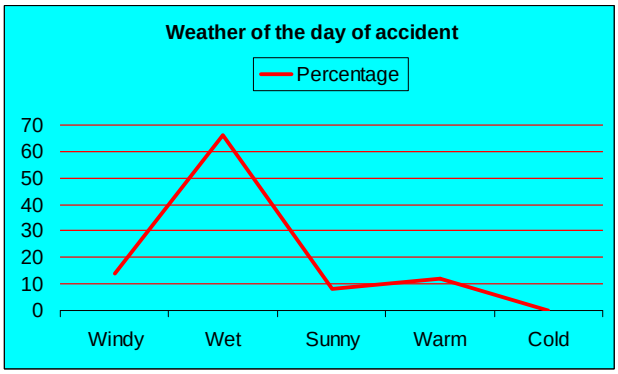

Fig.3: Weather on the day of accident

It was observed that majority of the RTAs occurred in Highway (40%) followed by Rural roads (36%) and city road (24%). This finding is supported by a study conducted in Rohtak, Haryana [17]. This is because people drive recklessly in open and wide highway without noticing anything and thus lose their control over their vehicles.

Among the light vehicles majority of the motorcycle riders were victims of RTAs (50%) followed by bicycle riders (32%) and among heavy vehicles 4-wheelers (Car/Jeep/Van) and tractors showed equal ratio. Similar results were also observed by Ghosh [17], Mehta [18], Varghese [22] and Zaheer M. etal [23]. This could be due to the higher speed, which can be achieved over short distances and less stability of the vehicles.

The common mode of RTAs was by hitting an object and losing control over the vehicle (32%) followed by falling down from the vehicle (22%), collision (20%) and knocked down (16%). But Ghosh [17] reported getting knocked down by vehicle as common mode of accidents.

In this study driver constituted 66% of the road users involved in RTAs followed by vehicle occupant 24% and the pedestrians 10%. Mehta [18] and Ghosh [17] stated that pedestrians are at high risk of RTAs followed by bicyclist and motorcycle riders eventually. This is due to rough driving, over speed and less stability of the vehicle.

This study found that 14% of the victims involved in RTAs had consumed alcohol (see Fig.4). This was high proportion compared to 4.6% and 8% as reported from Delhi [17, 20].

The role of alcohol in imparting driving ability is well documented. Also the impairment increases as the blood alcohol rises. In addition, the risk of accidents is higher in youngsters and elderly people for same blood alcohol levels [1].

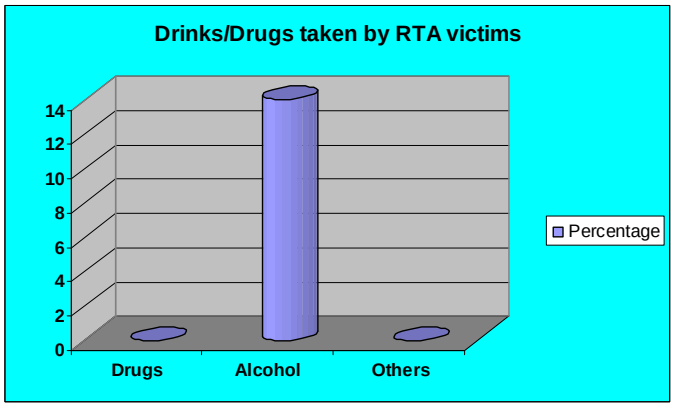

Fig. 4: Drugs/Drinks taken by RTA victims

Majority (52%) of the victims were in moderate condition on admission while 32% were in mild condition and 16% were in severe condition during their admission in the Hospital.

In the study multiple body parts were involved in each case which constituted of 54% followed by crush injury and abrasion 28% and 22% respectively. Most of the injuries occurred in lower extremities (27%). Most impacts were seen in upper and lower extremities and next were head region (19%). Similar results were also observed in emergency department of KMC Teaching Hospital [12].

Head injury was distributed mostly among the RTA victims of motorcycle riders (22%) followed by bicycle riders (16%) and pedestrians (4%). This is due to rough driving and over speed of the less stable vehicle.

a. Implication of the study

1. As we know that accidents are inevitable, this fatalistic attitude must be curbed by following activities.

i. Safety education must be given to the school children.
ii. The drivers need to be trained in proper maintenance of vehicles and safe driving.
iii. Young people need to be educated regarding risk factors, traffic rules and safety measures.
iv. They should also be trained in first aid, as it has been aptly said that "if accident is a disease, education is its vaccine".

2. There should be an inter-sectoral approach to both prevention and care of the injured. For this, there should be an accident service organization and one fully equipped specialized trauma care hospital in all major cities.
3. Unusual behavior of men and animals should be avoided on the road.
4. Large number of old vehicles, often over loaded, poorly maintained vehicles should be avoided.
5. Improvement of defective roads, poor street lighting and defective layout of cross roads and speed breakers decrease the incident of RTAs.

b. Recommendation of the study

There is clearly a need for road safety education and it should be directed towards road users, who are frequently involved and inured in RTAs (e.g., students). An integrated program of road safety education is suggested.

- ✓ Pre-school children may be introduced to the elementary concepts of road safety through stories involving the animal world.
- ✓ Primary school children may be given practice guidance on the use of side walks and road crossing techniques.
- ✓ For middle school students road signs should be introduced.
- ✓ High school students can be taught about reaction time, braking distance, defensive driving and hazards of alcoholic drinks. Road side random breath testing for alcohol should be done by using breath analyzers, which can be confirmed by blood concentration level of alcohol.
- ✓ There is need of interventions like awareness to the people about RTA and its hazards, school education programs about traffic rules and safety measures.
- ✓ Strict implementation of traffic rules and regulations are important measures to avoid RTAs.
- ✓ As this study shows head injury was common among motorcycle riders, the use of properly designed helmet should be made compulsory. This might be effective to reduce the head injury.
- ✓ Social awareness to avoid alcohol and narcotics during driving should be emphasized.
- ✓ Improvement of road conditions should be done for controlling RTAs.
- ✓ Involvement of private sectors should be promoted in the construction and maintenance of road networks.
- ✓ Proper research, technological development, environmental management should be promoted during road construction and expansion.
- ✓ Planned system should be adapted to repair and maintenance, expand and upgrading of roads and bridges.
- ✓ Institutional development and capacity building should be favored as per the policy of open and liberal economy and decentralization.
- ✓ The complete, elaborative and clear history of RTA victims should be recorded by concerned health professionals; this would help in the preparation of good data base for future studies.
- ✓ The medico-legal case sheet must be designed in a proper way to get more and valuable information.
- ✓ This type of study can be conducted in different regional and central hospitals.
- ✓ To bring down the RTAs, there is urgent need of coordination among traffic police, transport department, health professionals, school teachers and various NGOs and INGOs working in this field.

The real pressure and motivation to improve driving skills can come only through licensing authorities by adopting stricter, more comprehensive and scientifically based test laying a stress on road rules, regulations and traffic control devices. At the time of giving license to the public transport vehicles, they can be given training in first-aid skills (Nurses may be deputed in all transport Department for the training in first-aid skills) so that victims are attended immediately in the post accident period.

Conclusion

Nepal has comprehensive safety plans for tackling traffic problems, but they are under funded and poorly coordinated. Ministries, donors and non-governmental organizations are actively interested in road safety issues, but all this has not yet translated in to a cohesive strategy or into a set of well coordinated actions. Moreover, there are gaps in the proposed national traffic safety action plans, which lack clear priorities based on a strategic analysis of the situation. Alcohol for example, appears to be a larger problem than is officially acknowledged throughout Nepal. Yet there are virtually neither countermeasures such as public education, and anti-drunken driving campaigns, nor even the legal ability to deter drunk drivers. The most vulnerable age group in RTA is 20-39 years and the students rank the highest in RTA so, this figure need to be decreased.

Worldwide experience has shown that tough but fair and targeted enforcement of measures against unsafe behaviors, along with mass behavior modification and education are crucial to the rapid improvement of road safety. Regrettably, enforcement is not a high enough priority in Nepal. At the same time the implementation of all aspects of any road safety plans are ultimately necessary. But the more pressing reality is that current allocations for road safety are inadequate and allocations for educational programs are even more deficient. The national policy for injury prevention and control in Nepal is in its final stage. However, there are big challenges ahead for the implementation of such policy throughout the country in an effective manner. There is lack of coordination between different stake holders working in the field of injury including road traffic accident and injury. The data are kept separately and not shared for developing immediate and future plans. Therefore, there is a need for the ministry of health to take the lead and coordinate the efforts of all agencies working for the prevention and control of road traffic injuries, and also in road safety.

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