

■ *Original Article*

EPIDEMIOLOGICAL STUDY OF FATAL HEAD INJURY IN ROAD TRAFFIC ACCIDENT CASES: A STUDY FROM BPKIHS, DHARAN

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Abstract

Setting: Study was performed in mortuary of B P Koirala Institute of Health Sciences (BPKIHS), Dharan. **Objectives:** 1. To know the various epidemiological factors related to road traffic accident cases. 2. To know the relationship of head injury in road traffic accidents with the factors like helmet use, type of vehicle involved in accident. **Study design:** longitudinal descriptive study. **Study unit:** 77 Dead bodies with fatal head injury from RTA coming to BPKIHS mortuary, a focal point in eastern Nepal **Study variables:** Demographic characteristics of the victims, time, day and month of accidents, type of accidents, vehicle involved in accidents etc. **Statistical analysis:** Proportion. **Results:** There were approximately 78% male and 22% female road traffic accident victims with head injury. Students were the highest (20.7%) among the victims. The highest number of accidents took place in the month of June (11.7%) and on Saturdays (24.6%). The pedestrians were the largest (45%) group of the victims. Among the motorized vehicles, two wheeler drivers were more (34%) victims in accidents. Out of 77 fatalities, 22% were found to have consumed alcohol. **Conclusion:** Due to bad and mismanaged roads and poor road traffic knowledge to the citizens, road traffic accidents are the most common cause of unnatural deaths in this region. Minimal use of helmet is the main cause of fatal head injury in two wheeler occupants.

Keywords: Head injury, Road traffic accident, Epidemiological study, Trauma, Injuries

Introduction

Head Injury as defined by the National Advisory Neurological Diseases and Stroke Council 'is a morbid state, resulting from gross or subtle structural changes in the scalp, skull, and/or the contents of the skull, produced by mechanical forces.' A road traffic crash is defined as a collision or incident that may or may not lead to injury, occurring on a public road and involving at least one moving vehicle. The dominance of head injury in road traffic accident is due to the fact that, when the victim is pushed or

knocked to the ground, he often strikes the head and also that the brain and its coverings are vulnerable to blunt trauma that would not so frequently be lethal if applied to other body parts. These injuries can range from a minor bump on the skull to a devastating brain injury. 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.

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Materials and methods

This study was conducted at BPKIHS, Dharan Nepal from 1st February to 2006 to 31st April 2007.

The study group-consisted of all the victims who died in RTA with head injuries and were autopsied in BPKIHS mortuary during the period mentioned above. For the purpose of the study, a Road Traffic Accident (RTA) was defined as accident, which took place on the road between two or more objects, one of which must be any kind of a moving vehicle. All cases with the history of head injuries in road traffic accident were taken for study.

Any injury on the road without involvement of a vehicle (e.g. 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. Decomposed body and body with no specific history of head injury were also excluded in the study.

The relative of the victims of the accidents and accompanying police were interviewed to obtain the information about the circumstances leading to accident. A pre-tested proforma specially designed for this purpose was used for interviewing in the BPKIHS, mortuary at the time of autopsy. The information collected consisted of age, sex, address, occupation, personal habits, socioeconomic status, time, date, day and type of vehicles involved in RTA etc. Post mortem examination findings were also recorded in the same proforma and analysed.

Results

A total of 274 cases were autopsied during the study period in BPKIHS, out of which, 124 cases were due to road traffic accidents (RTAs). Among them 77 cases had head injuries.

Table I: Age and sex distribution of victims.

S.N.	Age Of Victim	MaleNo.	Male%	FemaleNo.	Female %	Total	Total %
1	< 10 YRS	3	3.9%	-	0%	3	3.9%
2	11-20 YRS	10	13%	2	2.6%	12	15.6%
3	21-30 YRS	11	14.3%	4	5.2%	15	19.5%
4	31-40 YRS	12	15.6%	2	2.6%	14	18.2%
5	41-50 YRS	10	13%	3	3.9%	13	16.9%
6	51-60 YRS	6	7.8%	3	3.9%	9	11.7%
7	>60 YRS	8	10.6%	3	3.9%	11	14.3%
	Total	60	78%	17	22%	77	100%

Table II: Different type of road user/victims

S. N.	Road Users Type	No.	Percentage
1	Pedestrian	37	48%
2	Cyclists	13	17%
3	Motercyclists	13	17%
4	Three Wheeler Occupant	2	2.5%
5	Four Wheeler Front Seater	5	6.5%
6	Four Wheeler Back Seater	7	9%
	Total	77	100%

Table III: Was the victim wearing helmet?

S.N.	Wearing Helmet	Number	Percent
1	Yes	6	8%
2	No	71	92%
	Total	77	100%

Discussions

Age of the victims

In present study (table-I) the age of the victims varied from 3-84 years. maximum number of fatalities occurred in 21-30 yrs age group (15 or 19.5%) followed by 31-40 yrs (14 or 18.2%), 41-50 yrs (13 or 16.9%), 11-20 yrs (12 or 15.6%) and >60 yrs (11 or 14.3%) the incidence was lowest in those bellow 10 yrs of age 3(3.9%).

A high incidence of fatalities in the above age groups may be explained by the facts that they are more often required to move outdoors in the pursuit of their works and studies. The incidence was lowest in peoples below 10 years for the obvious reason that they are least required to move out on the roads either for their works or studies.

This is in accordance with studies done by Tyagi², Sinha & Sengupta³, Banerjee⁴, Salgado⁶, Wong ZH.²² Larsen⁷ observed that the most common age

group is 26-30 years. Some of the above authors have studied much more cases than ours but still the commonest age group remains the same.

The study conducted by Dikshit⁸ found the common age group was 21-40 years (46%). Tripude⁹ also pointed that the least affected age group was more than 61 years. Brodie L(2009)²⁰ found 44 years as mean age while Wick¹⁰ said that mean age is of 28.8 years and 27.9% of total cases belonged to age group 25-30 years.

Sex of the victims

In the present study (table I), Over 3/4th of the victims were males (60 or 78%) while the females constituted only 17(22%) cases. The male to female ratio in the study was 3.53:1. The preponderance of male over the females in road traffic accident deaths may be explained on the basis that the women apart from children are generally habituated to remain indoors and hence are not so much exposed to the risk of accidents on the roads.

Brodie L²⁰ found 100% male while Tyagi² reported 5 times male involvement compared to females. Sinha and Sengupta³ reported 80% male and 20% female incidence. Banerjee⁴ reported 86% male and 14% female incidence. Johnson¹¹ reported the incidence to be 89% males and 11% females in Illinois, USA, Dikshit⁸ reported 71.74% male victims in total cases. Sathiyasekaran¹² said 82.5% male constituted total study, VV Pillay¹³, Kelsch¹⁴ were of same opinion.

Educational status of the victim

Highest number of victims in present study were illiterate (20 or 26%) followed by those who were educated up to primary 18(23.3%), secondary 16(20.7%) and high school 11(14.2%) level. Thus over 3/4th(65 or 76.8%) victims were either illiterate or had education only up to schools level, which gives the indication that lack of road traffic senses resulting either from illiteracy or poor literacy may have been a significant contributory factor to the factor to the causation of fatal road traffic accidents.

Occupation of the victims

In the present series highest number of victims were students (16 or 20.7%) followed by farmers (15 or 19.5). The reason for this may be attributed to the fact that these classes of persons are most often required to move out on the roads in the process of their studies and work. House wife constituted 14 cases (18.2%) which is a significant figure and can be justified by the

fact that in many communities in this region due to the husband being in army and outside the country, females has to perform the outdoor works also.

Month wise/seasonal, day and time wise distribution of the accidents

Largest number of the accidents took place during the summer months of March, April, May and June (35 or 48.1%) which could be attributed to the fact that this is the season for marriages, and also for harvesting and marketing of the grains. These are also the vacation months eventuated by increased movement of people from one place to another through the road transport. Next in order of frequency of the number of accidents were the months of November, December, January and February (22 or 28.6%) these being not only the festive months of Dashain and Tihar but also the harvesting months for the autumn crops. It is also possible that the foggy weather of the winter months, the total accidents leading to the head injuries is increased. The least incidence having group was the month comprising of July, August, September and October with (20 or 26%) cases which could be due to a smaller number of people coming out the roads in rains and the vehicles moving at a slower speed in order to escape slippage on the wet roads.

Most of the incidents irrespective of the cause occurred on Saturday (19 or 24.6%) may be because as it is holiday so there is more congestion on the road, and maximum of the incidents occurred either between 12pm to 3 pm or 6pm to 9 pm (18 or 23.3%) followed by 9am to 12 pm (16 or 20.7%)

Type of road users/ victims

In the present series (Table II) of study, about half of victims (37 or 48%) were pedestrians followed by pedal cyclists and cyclists (13 or 16.9%) each. There was no rickshaw victim because there are less no of rickshaw in Dharan due to mountains.

In most of the series of fatal cases of road traffic accidents studied by different workers it has been observed that pedestrians were the most commonly victims of such accidents, Bhaskaran et al¹⁷ (1967-70.55 percent), Agrawal and Agrawal¹⁸ (1967)-71.9 percent, Fimate and Chandra (1992)¹⁹ -54.2 percent. Freytag (1963)¹⁶ in his series of 1397 autopsied cases of head injuries recorded 23% of the victims to be pedestrian. Sevitt (1968) in his study of 250 subjects found pedestrians to have contributed to as

many as 50 percent of the cases. Olukoga A. (2008)²¹ in their series of road traffic accidents observed that, 61% of the victims were pedestrians. Vehicle occupants constituted 18.8 percent of the fatal accidents in Bhopal Agrawal and Agrawal¹⁸, 1967) and 11.6 percent in Hyderabad (Bhaskaran¹⁷ et al, 1967) while Sevitt (1968) found that vehicle occupants constituted 24.8 percent of the cases involved in fatal road traffic accidents.

Types of accidents in relation to the number of vehicles involved

In the present study single vehicles were involved in a very large number of cases (59 or 76.5%) and in only about (18 or 23.5%) cases double vehicle. None of the accidents involved more than two vehicles.

Agrawal and Agrawal¹⁸ (1967), out of 65 cases reported from Bhopal, classified 58 (90.6%) cases as single vehicle and 4 (6.24%) cases as double vehicle accidents: and in the cases reported by Bhaskaran et al (1967) from Hyderabad out of a total of 197 cases, a collision between two vehicle occurred in 13(6.6%) cases. Among the offending vehicles Dikshit¹⁸ found that trucks were responsible for accidents in 28.09% cases followed by cars in 22.99% of cases and bus in 17.14% of cases.

Predisposing factors for the accidents

It was seen that high speed vehicle was the main cause in more than half of the total fatal accident, (50.5%) while victim's carelessness, (32.5%), intoxicated drivers (25.5%) and slippery road (10%) were other contributory factors. Since one accident had one or many predisposing factors so these factors are more than the actual cases. Due to presence of high speed microbus in Dharan, the high speed vehicle is one of the most common reasons. Clarke DD(2010)²³ found high speed vehicle predisposing factor in 65% of accidents.

Was the victim wearing helmet?

In the present study (Table III), more than 9/10th of victims (71 or 92%) were not wearing the helmet and that might be the cause of large number of fatalities.

This is clear that if the use of helmet would have been more, death might have been less. Shafi et al²⁵, (1998) opined that the bicycle helmet safety law resulted in a 13-fold increase in the use of bicycle helmets among the children and helmet use reduced the severity of head injuries, and might have

prevented deaths caused by head injuries Wick M, (1998). Although There was a high rate of helmet use (98.8%), the head region was affected in 12 victims out of 86 studied. Van Camp et al²⁴, (1998) revealed that helmets do prevent head injury in motorcycle and moped accidents, especially in those crashes involving relatively low kinetic energy transfers. Helmet use does not lead to an increase of the incidence or severity of cervical spine injury. It was seen that about 1/4th of the victims (17 or 22%) were intoxicated at the time of accidents while in the rest (58 or 75.5%) cases status was unknown.

Conclusion

From our above study comprising 77 cases with fatal road traffic accident due to head injuries, it may be opined that the injuries to the skull and brain are the major and significant contributory factors in the causation of the fatalities on the roads resulting from the automobile accidents.

Commonest victim was young adults or middle aged male who was perhaps bread earner in family. Majority of cases occurred in open daylight obviously due to over-crowding on the roads, with high speed vehicle and poor road traffic sense of the victims.

The traditional medical and surgical treatment has very less role to play for saving life in head injury cases; and only prevention by way of improved automobile designs, increased use of safety devices such as seat belts and crash helmets, improved construction and maintenance of the roads, better traffic monitoring and prevention of drunken driving amongst the automobile drivers, increased road traffic sense in road users, a strict medical checkup before issuing driving license and last but not the least a quick and deterrent punishment to the defaulting automobile drivers.

Message for Road Designers/Planners

A complete road should comprise lanes for vehicles, lanes for by-cycle, and lanes for pedestrians. Helmet use should be made mandatory for the two wheelers (cycles, bicycles) occupants.

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