Epidemiological Correlates and Pattern of Injuries in Road Traffic Accident Victims Attending a Tertiary Care Hospital in Northern India

Anil Juyal*, Ruchi Juyal, Atul Agarwal*, Rajesh Maheshwari***, Jayanti Semwal**, Shaili Vyas******

*Professor, *** Professor & Head, Department of Orthopaedics, HIMS, **Professor, ****Associate Professor, Department of Community Medicine, Himalayan Institute of Medical Sciences, Swami Rama Himalayan University, Dehradun, India

Abstracts: Background: Road Traffic Accidents (RTAs) are major public health concerns exerting a huge burden on the health system. According to WHO, 1.2 million people lose their lives every year owing to RTAs. Objective: To find out the pattern of injuries among patients of RTAs presenting to a tertiary care hospital of Uttarakhand and to find the association between RTAs and various factors. Method: All the eligible patients or their care takers attending the emergency department were interviewed after taking informed consent over a period of one year. Results: Overall 717 respondents were interviewed. The mean age of the victims was 34.0 years ±15.093. Significantly more accidents took place between 6:00 PM and midnight (41.6%) and on the highways (69.2%). Two wheelers were responsible for majority (60.1%) of the accidents. Head injuries (25.6%) were most common, closely followed by lower limb injuries/ fractures (23.8%). Head injuries were significantly more in 2-wheeler riders, who did not wear helmets. Conclusion: RTA is preventable non-communicable disease which is on rise due to ignorance and non-compliance of traffic rules as well as bad conditions of roads. Stringent road and traffic policies are required which are to be followed with strict compliance. [A Juyal, Natl J Integr Res Med, 2018; 9(3):9-13]

Key Words: Road traffic injury; factors; pattern, tertiary care hospital, Northern India

Author for correspondence: Ruchi Juyal, Professor, Community Medicine, HIMS, Swami Ram Nagar, Doiwala, Dehradun, Uttarakhand. E-Mail: aniruchi08@gmail.com M: 9411177327

Introduction: Road traffic injury (RTI) is a major but neglected public health challenge that requires concerted efforts for effective and sustainable prevention. It is among the leading causes of preventable deaths. Over 1.2 million people die each year on the world's roads, with millions more sustaining serious injuries and living with long-term adverse health consequences[1]. Road traffic injuries cause considerable economic losses to victims, their families, and to nations as a whole[2].

Majority of the world's fatalities on the roads occur in low-income and middle-income countries, even though these countries have approximately half of the world's vehicles. India is no exception and data showed that more than 1.3 lakh people died on Indian roads, giving India the dubious honour of topping the global list of fatalities from road crashes[3].

Road traffic injuries have been neglected from the global health agenda for many years, despite being predictable and largely preventable. Evidence from many countries shows that dramatic successes in preventing road traffic crashes can be achieved through concerted efforts that involve, but are not limited to, the health sector[2].

The contribution of Socio-demographic factors has also been studied in some studies. Low socioeconomic status has been found to be associated with traffic injury on an individual level[4], a regional level[5], and a national level[6].

Uttarakhand state in India has been carved out from the state of Uttar Pradesh in 2000. Till date very few studies have been done on the pattern and prevalence of Road Traffic Injuries (RTI) in this state. The geography of the region, lack of proper traffic regulation and increased traffic during Yatra season makes it vulnerable for RTIs.

This study was conducted at the tertiary care hospital of Himalayan Institute of Medical Sciences, Dehradun, Uttarakhand, India. The Himalayan Hospital is a 750 bedded multi-specialty hospital, providing routine as well as super specialty services at an affordable cost. The experience here shows that the problem of RTI is quite serious in this region. This paper is a part of a larger study which was conducted to know the magnitude of the problem in the area as well as the determining factors.

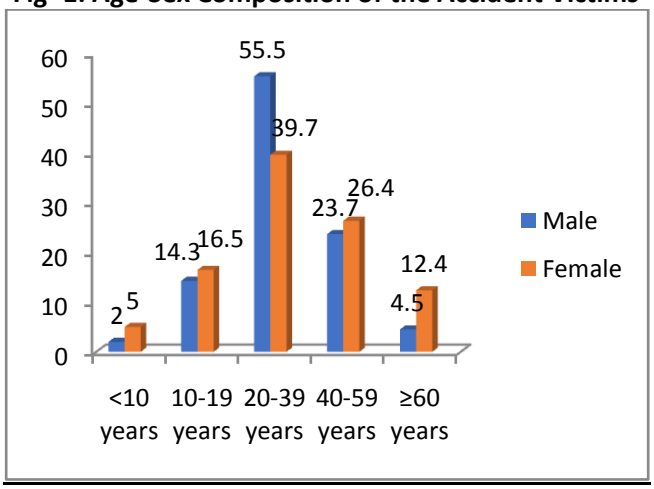
Objective: To find out the association between various factors and Road Traffic Injuries in cases presenting to a tertiary care hospital.

Methods: Ethical clearance was sought from the university (SRHU) before starting this study. All the victims of the Road Traffic Injuries (RTIs) attending Orthopaedic emergency department of HIMS during

the study period (12 months) were interviewed (after taking written informed consent) to obtain information about the circumstances leading to the accident. A predesigned and pretested questionnaire especially designed for this purpose was used for interviewing the accident victims, either in the emergency itself or in the wards of the Himalayan hospital. Where the condition of the victims did not warrant the interview, the relatives or attendants were interviewed. Those who did not give consent were excluded from the study. The data so collected was entered and analyzed through SPSS 20.0 software as well as Excel.

Result: A total of 763 patients of Road Traffic Injury (RTI) attended the emergency department of Himalayan Hospital during the study period of one year. Out of them 717 patients (94.0%) could be interviewed. Among these, 83.4% were male and 16.6% were females, thus giving a male female ratio of 5.02:1. The mean age of the victims was 34.0 years (range: 1-92 years, SD- 15.093). Majority of the victims (49.8%) belonged to the age group 20-39 years. (Fig-1).

Fig -1: Age-Sex Composition of the Accident Victims



Most of the RTI victims belonged to the upper – middle class (34.2%) followed by upper class socio-economic status (27.2%). About 16% of the victims were from lower-middle to lower class. Overall 73% of the victims were married and 0.8% widowed. Majority of the patients were Graduate and above (39%) and only 6.4 % victims were illiterate. Most of the victims were servicemen (23.4%) closely followed by businessmen (21.7%). The trend was same in male victims, while most of the female victims were housewives (39.1%) and 11.3% were in service.

Table 1: Victims by Time and Location of the RTI

Variable	Frequency (717)	Percentage
Time slot		
12:01 AM- 6:00 AM	34	4.7
6:01AM - 12:00 noon	151	21.1
12:01 PM - 6:00 PM	234	32.6
6:01PM-12:00 Midnight	298	41.6
Location		
Brick road	29	4.0
Highway	496	69.2
Others (Municipal/ rural/ kutcha road)	192	26.8

The time of accident was broadly categorized into late night- early morning (12:01 am- 6:00 am), morning-forenoon (6:01am - 12:00 noon), afternoon (12:01 pm - 6:00 pm) and evening categories (6:01pm-12:00 midnight). This can be depicted from table -1 that most of the accidents (41.6%) occurred in the evening time (6:01 PM to 12:00 Midnight), followed by in afternoon i.e. between 12:01 PM - 6:00 PM (32.6%). Almost 70% of the accidents took place on highways followed by on municipal/rural/kutcha roads (26.8%).

Fig-2: Occupancy of vehicle at the time of accident

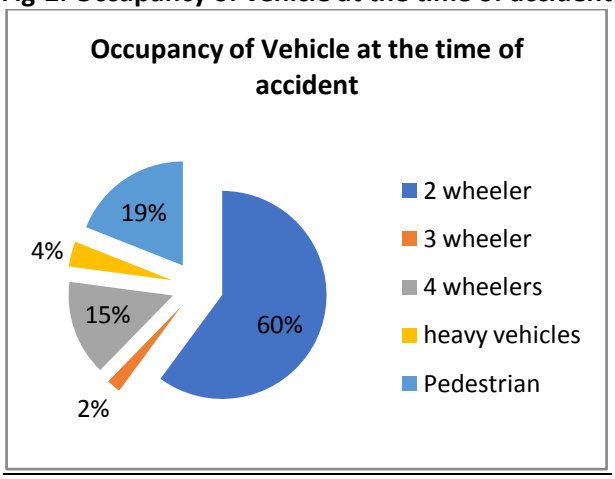


Fig-2 depicts that two wheelers particularly motorcycles (86% of two wheelers) were responsible for majority (60.1%) of the road traffic accidents; followed by 4 wheelers (14.8%). Majority of the victims (53.3%) were driver of the affected vehicle (Fig-3), followed by passengers (28.7%). Among 136 pedestrians (18.9%), more than 70% were walking or working roadside, when the vehicle struck them.

Table 3: Distribution of injuries among patients

Vehicle type	No. of persons	Injury / Fracture				
		Head	Spinal	Limb injurie	Others	Total
2 wheelers	431	177(41.1)	10(2.3)	250(58.0)	199(46.2)	636
3 or 4 wheelers	150	56(37.3)	5(3.3)	110(73.3)	96(64.0)	267
Pedestrian	136	41 (30.1)	3(2.2)	86(63.2)	37(27.2)	167

Out of total injuries i.e. 1070, head injuries accounted for 25.6% of cases, closely followed by lower limb injuries/ fractures (23.8%) and maxillo-facial fractures/ injuries (19.4%). It was seen that head and limb injuries/ fractures were the main injuries among drivers and passengers of vehicles involved in accidents, as well as pedestrians. Head injuries were reported maximally in people riding 2 wheelers, closely followed by 3/4 wheelers (41.1% and 37.3% respectively); while most of the 3 or 4-wheeler occupants and pedestrians sustained limb injuries (73.3% and 63.2% respectively).

Among the victims riding two wheelers (431), only 81 (18.8%) were wearing helmets and among car riders, only 15.5% had their seat belts tied.

Table 3: Head injury in two- wheeler riders by use of Helmet

Helmet Use	Head Injury		Total
	Yes	No	
Yes	25 (30.9)	56 (69.1)	81
No	152(43.4)	198 (56.6)	350
Total	177(41.1)	254 (58.9)	431

Head injuries were significantly more common in those two-wheeler riders, who were not wearing helmets at the time of accident (χ^2-4.29, df-1, $p<0.05$). The patients who were injured on highways had more head injuries and maxillo-facial injuries as compared to those who got in accidents on municipal and other types of roads. This difference was found to be highly significant statistically (table not shown). Lower limb injuries were significantly more in victims involved in accidents on municipal roads.

Discussion: Road traffic accident injuries are one of the most prominent causes of injuries worldwide. Though developing countries account for an estimated 48% of motorized vehicles, they are the place where 91% of road traffic related fatalities occur every year[7].

In the present study, 83.4% of the victims were male and 16.6% were females, thus giving a male female ratio of 5.03:1. Similar findings were reported by Khare et al in Bhopal (82.5%- males & 17.5%- females) and Jha et al in JIPMER (83%-males & 17% females) [8,9]. Singh D et al from Chandigarh also found male preponderance (89.6%) among RTA victims in their study[10].

The mean age of the victims was 34.0 years (range: 1-92 years, SD- 15.093) and majority of the victims (49.8%) belonged to the age group 20-39 years. This is comparable to the findings of Uthkarsh PS et al[11] from south India (35.3 years) and Patil S (32.5 years) in Maharashtra[12].

In the present study, most of the accidents (41.6%) occurred in the evening time (6:01 PM to 12:00 Midnight), followed by in afternoon i.e. between 12:01 PM - 6:00 PM (32.6%). Dixit S[13] in Srinagar, Garhwal reported similar findings, where half of the accidents occurred between 6 PM to 9 PM followed by 12 PM to 6 PM (36.8%). Likewise, in a survey in community setting in district Dehradun, similar results were found by Sharma S et al[14]. Similarly, in a study from Kanpur, DebbarmaS et al[15] reported that maximum number (28.74%) of Road Traffic Accidents (RTA) took place between 4.00 p.m.-8.00p.m. while the least number (4.43%) took place between 4.00 a.m.-8.00a.m. In contrast, Shah and Jarwani[16] reported that Most of the accidents in their study took place in early morning to noon hours [6 am to 12 noon] (36.67%).

Almost 70% of the accidents took place on highways followed by on municipal/rural/kutcha roads (26.8%). This is because this tertiary care hospital is situated near Dehradun-Haridwar highway and most of the accidental cases occurring there are either directly or through referral are brought here.

Two wheelers particularly motorcycles (86% of two wheelers) were responsible for majority (60.1%) of the road traffic accidents; followed by 4 wheelers

(14.8%). Similar findings were reported by Singh D et al[17] in a 25 year (1977–2002) autopsy study of fatal accidents from a tertiary care hospital of Chandigarh. They revealed that two-wheeler occupants (33.3%) were the main victims in Road Traffic Accidents. DebbarmaS et al[15] found that maximum number (36.95%) of RTA victims were two-wheeler drivers followed by two-wheeler riders (26.60%).

Majority of the victims (53.3%) were driver of the affected vehicle (Fig-3), followed by passengers (28.7%). Among 136 pedestrians (18.9%), more than 70% were walking or working roadside, when the vehicle struck them. Shah and Jarwani[16] also found that passengers & pedestrians contributed to 41% of the accident cases in their study. A study from Nepal reported a much higher incidence of pedestrians (56.54%) in the RTA cases reporting to the hospital [18].

In the present study, three fourth of the accidents occurred due to collision between vehicles, commonest being side collision (46.6%). The other causes like skidding/ toppling over of vehicles/ impact with some fixed object accounted for 26.1% of cases. Yadav et al[19] in Rewa reported similar findings where side on (40.33%) and head on (34.84%) collisions contributed to most of the RTAs.

It was seen that head injuries were the main injuries among drivers and passengers of vehicles involved in accidents, while maximum number of pedestrians suffered from lower limb injuries/ fractures. Likewise, in a study conducted in Delhi, it was reported that in pedestrians, lower extremity (63.8%) and head and neck region (59.4%) were most commonly involved[20]. Head injuries were reported maximally in people with 2 wheelers occupancy closely followed by 4 wheelers (41.1% and 38.8% respectively). Debbarma et al[15] also found that maximum number of two-wheeler users sustained head injury in their study.

Conclusion: In recent years there has been a consistent increase in the number of vehicles on the roads leading to increased risk for road traffic accidents (RTAs) to occur. In India, there are ample risk factors for RTAs to occur because of lack of proper infrastructural facilities, poor designs of roads, improper implementation of traffic rules and a high load of variety of vehicles on the roads.

The prevention of RTAs is tremendously vital and strict abiding of people from traffic laws & safety measures is required to bring down the road traffic accident rate & related mortality and morbidities. Use of protective gears like helmets & seatbelts has a significant role in preventing severe head and other injuries and should be strongly advocated and strictly followed. More stringent measures need to be taken for pedestrian & bystander safety. More focus should be on fully equipped secondary and tertiary level trauma centres for managing RTA victims. Doctors and health care staff should be trained in rapid triage, assessment of injured trauma victims, identification and timely treatment of life threatening injuries etc.

Acknowledgement: The authors are grateful to the SRH University for providing financial as well as other support for this project. We also thank the patients, their relatives/ care takers as well as emergency ward staff of HIMS for their cooperation during this survey.

References:

1. WHO. Global status report on road safety 2015. www.who.int/violence_injury_ prevention /road_safety_status/2015/en/
2. http://www.who.int/mediacentre/factsheets/ fs358/en/ accessed on 26.02.2018
3. www.nhp.gov.in/road-traffic-accidents_pg accessed on 26.02.2018
4. Hasselberg M, Laflamme L. Road traffic injuries among young car drivers by country of origin and socioeconomic position. Int J Publ Health. 2008;53(1):40–45.
5. Moudon AV, Lin L, Jiao J, Hurvitz P, Reeves P. The risk of pedestrian injury and fatality in collisions with motor vehicles, a social ecological study of state routes and city streets in King County, Washington. Accid Anal Prev. 2010;43(1):11–24.
6. Van Beeck EF, Mackenbach JP, Looman CW, Kunst AE. Determinants of traffic accident mortality in The Netherlands: a geographical analysis. Int J Epidemiol. 1991;20(3):698–706. doi: 10.1093/ije/20.3.698.
7. Schmucker U, Seifert J, Stengel D, Matthes G, Ottersbach C, Ekkernkamp A. Road traffic crashes in developing countries. Unfallchirurg. 2010;113 (5):373-7.
8. Khare Neeraj, Gupta Sanjay K, Varshney Atul, Athavale AV. Epidemiological Study of Road Traffic Accident Cases attending Tertiary Care Hospital in

Bhopal, Madhya Pradesh. NJCM. 2012; 3 (3): 395-9.
9. Nilamber J, Goutam R, Jagdish S. Epidemiological study of Road traffic cases: A study from south India. IJCM 2004 Jan –mar; 21 (1): 20-4.
10. Singh D, Kumaran M, Singh SP, Goel S. Profile of Road Traffic Fatalities in Adults-A 40 Year Study in Chandigarh Zone of North West India. J Indian Acad Forensic Med. 2014; 36(1): 47-51.
11. Uthkarsh, P. S.et al (2012). Profile of injury cases admitted to a tertiary level hospital in south India. International journal of injury control and safety promotion, 19(1), 47-51.
12. Patil, S. S., Kakade, R. V., Durgawale, P. M., &Kakade, S. V. (2008). Pattern of road traffic injuries: A study from western Maharashtra. Indian journal of community medicine 2008; 33(1): 56.
13. Dixit S, Tyagi PK, Singh AK, Gupta SK, Malik N. Clinico– epidemiological profile of road traffic incidents admitted at a tertiary care hospital in Garhwal Uttarakhand. JEMDS. 2012;1(3):83-90.
14. Sharma SM, Juyal R, Vyas S, Semwal J. Prevalence and risk factors of non fatal road Traffic accidents in a community setting of District dehradun. NJMR 2016;6 (1): 42-4.
15. Debbarma S, Nigam S, Martolia DS, Varma P, Barman SK, Midha T. Correlates of road traffic accident in cases attending IIR hospital Kanpur. Indian J Comm Health. 2016; 28, 1: 65 - 70.
16. Shah A, Jarwani B. Study of patients of road traffic accidents arriving in emergency department [ED] of V.S hospital at Ahmedabad city, single centre pilot study. 2018;8–9.
17. Singh, D., Dewan, I., Pandey, A. N., & Tyagi, S. (2003). Spectrum of unnatural fatalities in the Chandigarh zone of north-west India–a 25 year autopsy study from a tertiary care hospital. Journal of clinical forensic medicine, 10(3), 145-152.
18. Banthia P, Koirala B, Rauniyar A, Chaudhary D, Kharel T, Khadka SB. An epidemiological study of road traffic accident cases attending emergency department of teaching hospital. J Nepal Med Assoc. 2006 Apr-Jun;45(162):238-43
19. Yadav SS, Singhal V, Lakhtakia PK, Rajpoot M. Study of road traffic accident cases reported in a tertiary care hospital in vindhya region of M.P. with the use of WHO/CDC injury surveillance system. J. Evid. Based Med. Healthc. 2016; 3 (8): 235-242.
20. C. Malhotra, M.M. Singh, S. Garg, R. Malhotra, B.K. Dhaon, M. Mehra. Pattern and Severity of injuries in victims of road traffic crashes attending a Tertiary care hospital of Delhi. Anil Aggrawal's Internet Journal of Forensic Medicine and Toxicology, 6 (2005), p. 2

Conflict of interest: None

Funding: None

Cite this Article as: A Juyal, R Juyal, A Agarwal, R Maheshwari, J Semwal, S Vyas. Epidemiological Correlates and Pattern of Injuries in Road Traffic Accident Victims Attending. Natl J Integr Res Med 2018; 9(3):9-13