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Research Article

Profile of non-fatal injuries due to road traffic accidents from a hilly northern state of India

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Abstract: *Introduction:* Due to ever growing number of vehicles, there have been spurt in the road traffic injuries. Everyday thousands of people are killed and injured on our roads affecting all age groups. Information on the injury patterns, nature, and outcome are extremely limited. Present study is an endeavor to explore some of these basic issues. We studied a series of non-fatal road traffic injury cases, which were severe enough to require admission to the hospital. *Methods:* The present case series has been carried out in the Emergency department of Indira Gandhi Medical College & Hospital, Shimla in year 2017-18. A structured, pretested, self-designed questionnaire schedule was used for interviewing RTA victims (an attendant in case victims was not able to provide information). This questionnaire includes information regarding socio-demographic characteristics of victims along with pattern of injuries. *Results:* A total of 410 Road Traffic accidents Victims have been studied in current study sustaining non-fatal injuries. 48.29% (n-198) of the road traffic accidents victims were in the age group of 16 - 30 years. 75% (n-307) of the victims were Male. Most common time of accidents was between 4:00 P.M. to 12:00 P.M. (45.61%). Most of accidents occurred on weekend i.e. Sunday 29.51% and Saturday 20%. Majority of accidents occurred in the third quarter 127 (30.98%) of the year. Light Motor Vehicle (Car) (54.88%) and motorized two wheelers (25.85%) were the most common vehicles involved in road traffic accidents. Most common major injury in current study was lower limb fracture (16.6%) followed by head injury (16.3%). *Conclusion:* RTAs have been found to be following a certain pattern like late night or early morning, weekends, rainy season etc. Adequate attentions need to be given to develop road safety education program and traffic control strategies.

Keywords: Road traffic accident, RTAs, road traffic injuries, non-fatal injuries.

INTRODUCTION:

Everyday thousands of people are killed and injured on our roads. Millions of people each year will spend long weeks in hospitals after severe crashes and many will never be able to live, work or play as they used to do. Road Traffic Accident (RTA) is among top five causes of morbidity and mortality in South-East Asian countries. (Paden, M. *et al.*, 202) They affect all age groups, but the impact on the young adults is most striking, especially in those between the ages of 15 and 29 years. Road traffic injury rates in many high income countries have stabilized or declined in recent decades, but in most of developing regions of the world they are on the rise due to increasing motorization. (The Global Burden of Disease. 2004)

Current efforts to address road safety are minimal in comparison to this growing human suffering. (WHO World report 2004) Approximately 1.2 million people die every year on the roads across the world and another 50 million sustain nonfatal injuries as a result of road traffic accidents (RTAs). (Global status report. 2015) In India, nearly 80,000 people get killed and 340,000 are injured every year in about 300,000 accidents on the road network of 22, 00,000 km — there is an accident every minute and death every eight minutes (Ministry of Home Affairs. 2010).

Himachal Pradesh is situated in the north west Himalayas and most of the area of the state has hilly terrains. Shimla is the capital of the state and is

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situated at an altitude of 2250 meters from the mean sea level. The city being a very popular tourist place since British times, attracts a large number of tourists throughout the year. It is well connected through national and state highways. Due to ever growing number of vehicles, there have been spurt in the road traffic injuries. According to National crime record bureau (NCRB) report 2015, in Himachal Pradesh (HP), total 3010 road traffic accidents had occurred and total no of persons injured were 5108. (National Crime Records Bureau. 2015) A survey conducted by social welfare council of India, revealed that Himachal Pradesh witnesses average 3,000 road accidents each year, killing over 1000 people and leaving 5000 injured. (The times of India. April, 2018)

Injuries are not considered a public health problem in all countries, but problem of individual, police and transport department. Moreover there is a lack of safety awareness in societies. (WHO-SEARO. 2002) High magnitude of deaths and injuries due to road traffic accidents warrant adequate attention from the health researchers to prioritize preventive and control strategies. Information on the injury patterns, nature, and outcome are extremely limited in India, as trauma registries and hospital-based research have not developed systematically. (Gururaj, G. 2008) Present study is an endeavor to explore some of these basic issues. We studied a series of non-fatal road traffic injury cases, which were severe enough to require admission to the hospital.

MATERIAL METHODS:

The present case series has been carried out in the Emergency department of Indira Gandhi Medical College hospital, Shimla. This hospital is one of the apex medical institutes of the State. Most of the road traffic accidents victims in city and surrounding areas were brought to this hospital. Besides this, it also caters to the referred victims of road traffic accidents for treatment from many of districts of the state. The study period was for one-year i.e. September 2017 through August 2018. Road traffic accident (RTA) is defined as an accident which took place on the road between two or more objects one of which had been in any kind of a moving vehicle and the other the human being. A structured, pretested, self-designed questionnaire schedule was used for interviewing RTA victims (an attendant in case victims was not able to provide information). This questionnaire included information regarding socio-demographic characteristics of victims along with pattern of injuries. The study was approved by the Institutional Ethics Committee. Written informed consent was obtained from all the participants included in the study. Data was analysed using Epi info version 7.2.2.software. Descriptive statistics were used to summarize the demographic data and results. Proportions and their 95% confidence interval were used to describe categorical variables.

RESULTS:

Total of 410 Road Traffic accidents Victims has been studied in current study sustaining non-fatal injuries. 48.29% (n-198) of the road traffic accidents victims were in the age group of 16 - 30 years. 75% (n-307) of the victims were Male. Victims from urban areas were 60.73% (n-249) as compared to 39.27% (n-161) from rural areas. Most (59.27%) of road traffic accident victims were intermediate or above. Only 7.56% were illiterate or educated up to primary school education (Table-1).

Table-1: Socio demographic characteristics of Road Traffic Accidents victims. (n= 410)

	Frequency (n)	Victims (%)	(95% CI)
Age groups (years)			
<15 years	39	9.51%	7.04 - 12.74%
16 – 30 years	198	48.29%	43.49 - 53.12%
31 - 45 years	124	30.24%	26.00 - 34.86%
46 – 60 years	37	9.02%	6.62 – 12.19%
>60 years	12	2.93%	1.68 -5.05%
Gender			
Male	307	74.88	70.46 – 78.83
Female	103	25.12	21.17 – 29.54
Locality			
Rural	161	39.27	34.66 - 44.07
Urban	249	60.73	55.93 - 65.34
Education			
Primary or below	31	7.56	5 – 10.12
High school	136	33.17	28.61 – 37.73
Intermediate or above	243	59.27	54.51 – 64.03

Table 2: Time Distribution of Road Traffic Accidents. (n=410)

Time of Occurrence of RTA	Frequency (n)	Victims (%)	(95% CI)
00:00 - 08:00 (HH:MM)	72	17.56	14.18 - 21.54
08:00 - 16:00 (HH:MM)	151	36.83	32.30 - 41.60
16:00 - 24:00 (HH:MM)	187	45.61	40.85 - 50.45

Most common time of accidents was between 4:00 p.m. to 12:00 p.m. (45.61%) followed by time between 8:00 a.m. to 4:00 p.m. (Table 2). Most of

accidents occurred on weekend i.e. Sunday 29.51% (n-121) and Saturday 20% (n-82) (Figure-1).

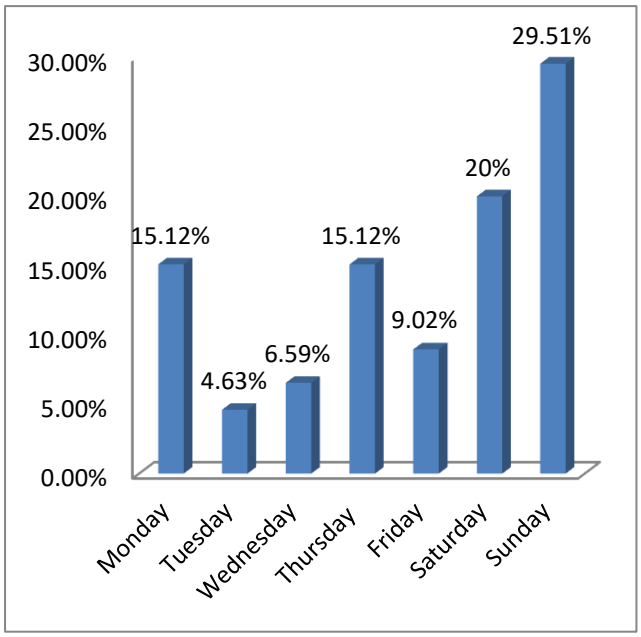

Figure 1: Distribution of RTA in Weekdays

Majority of accidents occurred in the third quarter 127 (30.98%) of the year whereas second quarter experienced the least 69 (16.82%) accidents (Figure 2).

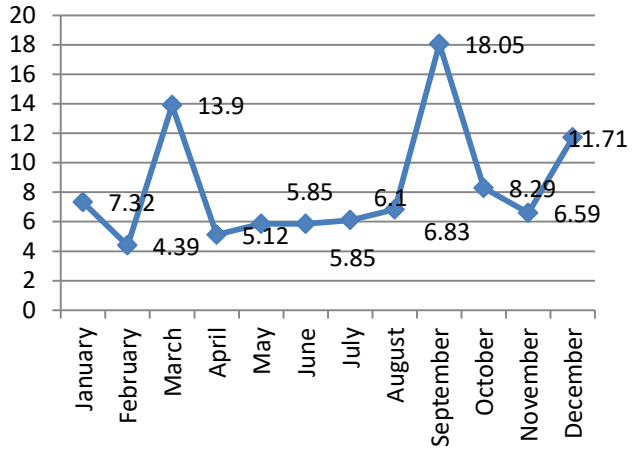

Figure 2: Distribution of the RTA during different months of the year (%).

Table 3: Different Types of vehicles and Pedestrian involved in Road Traffic accidents. (n=410)

	Frequency (n)	Victims (%)	(95% CI)
Vehicle			
MTW (Bikes, scooters etc.)	106	25.85	21.85 – 30.30
Light Motor Vehicle (Car)	225	54.88	50.04 -59.63
Non-motorized Two Wheeler	2	0.49	0.13 – 1.76
Pick-up, jeep	5	1.22	0.52 -2.82
Truck	8	1.95	0.99 – 3.80
Bus	6	1.46	0.67 -3.16
Pedestrian	58	14.15	11.11– 17.85

Light Motor Vehicle (Car) 225 (54.88%) and motorized two wheelers 106 (25.85%) were the most common vehicles involved in road traffic accidents. 58 (14.15%) of the victims were pedestrian. (Table 3)

Table 4: Natures of injuries among RTA victims in current study. (n-410)

Natures of injuries		Frequency	%age	(95% CI)
Major	**Skull fracture**	9	2.20	1.16 – 4.12
	Spine fracture	19	4.63	2.99 – 7.12
	Upper limb fracture	41	10	7.46 - 13.29
	Lower limb fracture	68	16.59	13.30 - 20.49
	Head injury	67	16.34	13.08 – 20.23
	Pelvis fracture	9	2.20	1.16 – 4.12
	Abdominal injury	63	15.37	12.20 – 19.18
Minor	**Laceration & open injury**	45	11.4	8.30 – 14.37
	Superficial injury	89	21.27	17.94 – 25.95

Most common major injury in current study was lower limb fracture (16.6%) followed by head injury (16.3%) and abdominal injury (15.4%). 22.3% had only superficial injury while 11.4% had laceration and open injuries (Table 4).

DISCUSSION:

In the current study, a total of 410 cases of road traffic accidents with non-fatal injuries reported at emergency department of I.G.M.C. Shimla, during the study period (September 2017 through August 2018). The highest numbers of RTA victims (48.29%) were found to be young people in the age group of 16 to 30 years. Almost similar results were reported from studied conducted by Mishra *et al.,* (2010) from Western Nepal 138 (38.33%). Mogaka *et al.,* (2011) from Kenya observed that three quarter of accident victims in their study group were between 20 to 49 years. In the present study around 88% of the victims were in the age group of 15 to 45 years. Similar results were also reported by Mahajan *et al.,* (2013) from Shimla in 2013. They reported male in age groups 20-29 years as most venerable for road traffic injuries. This shows that people in most active and productive age groups were frequently involved in accident.

In the present study, 75% of the victims were male, with male: female ratio of 3: 1. Similar results were reported by Mishra et al *et al.,* in Nepal where 75% of the road traffic accident victims were male. In India, S. Pravin *et al.,* (2016) from Aurangabad City and Dutta *et al.,* (2015) from Tamil Nadu reported similar results i.e. 84 % of victims were male. Male being more mobile and exposed to roads as compare to females are vulnerable for road traffic accidents.

Victims were more from urban areas (60.73%) as compared to rural areas (39.27%). Similarly Dutta *et al.,* (2015) reported almost 60% of the RTAs had taken place in urban areas when compared to rural areas. Possible reason might be the higher exposure of urban people to heavy traffic in comparison to rural areas. In the current study, most of the road traffic victims were educated up to higher secondary (33.90%) followed by matriculation (23.90%). Similarly finding was reported from other study. (Pathak, S.M. *et al.,* 2013; Joshi, A.K. *et al.,* 2014) These finding can be attributed to overall high state literacy rate (82.8% as per census) in study area (Himachal Pradesh census. 2011).

Considering the time of the day, majority of accidents (45.61%) occurred between 4:00 p.m. to 12:00 p.m. followed by those occurring between 8:00 a.m. to 4:00 p.m. (36.83%). Study done in Nagpur by Ganveer *et al.,* (2005) and in Delhi by Malhotra *et al.,* (2005) reported that accidents mostly occurred during 3:00 pm to 11:00 pm. Similar results were reported by others as well. (Nasrullah, M., & Muazzam, S. 2012) A study done in Nepal was also similar wherein majority of the accidents were reported to occur between 3:00 pm to 7:00 pm.(Mishra, B., *et al.,* 2010) Higher frequency of accidents during these hours coincides with relatively high traffic movement due to closure of educational institution, offices in the capital and probably poor traffic control by authorities. Majority of accidents occurred on weekend i.e. Sunday (29.51%) and Saturday (20%). Another study from rural Haryana also reported maximum RTAs case on Saturdays (Pathak, S.M.0, *et al.,* 2013), whereas a study from Nepal has observed most of case on Sunday (Mishra, B., *et al.,* 2010) and Gosh *et al.,* (1992) had reported more cases on Mondays. This could be due to influx of tourists as the area is famous tourist destination besides being state capital and also due to people visiting their nearby native places on weekends and returning to work places for Monday.

Majority of accidents occurred in the third quarter i.e. rainy seasons, July to September (30.98%) of the year whereas second quarter experienced the least (16.82%) accidents. It might be due to wet condition of roads and adverse weather conditions e.g. fog, a common occurrence in this part of country which impairs the visibility of the drivers of the vehicles. The spurt of RTAs during rainy season was also observed by Mishra et al from western Nepal (Mishra, B., *et al.,* 2010). In another study conducted by Kiran *et al.,* (2004) 78% of the accidents occurred in monsoons and others studies also showed similar results (Dutta, R., *et al.,* 2015; Malhotra, C. *et al.,* 2005; Singh, A. *et al.,* 2011)

Majority of the victims were using light Motor Vehicle (54.88%) followed by motorized two wheelers 106 (25.85%). However other studies have reported motorized two wheelers to be dominantly involved with the road accident (Shakeer, K. P., *et al.,* 2017; Kumar, M. *et al.,* 2017) This may be because of hilly terrain of the study area, MTW are less commonly used as compared to LMV.

Lower limb fracture was the most common major injury (16.6%) followed by head injury (16.3%), abdominal injury (15.4%) and superficial injuries (32.7%). Similar result has been reported by Pathak *et al.,* (2013) and others studies from different parts of country (Mahajan, N.*et al.,* 2013; Malhotra, C. *et al.,*2005). In current study, 32.31% of victims had only superficial injury which was in contrast to the result mentioned in study conducted in Delhi (Nasrullah, M., & Muazzam, S. 2012). Management of superficial injury at nearby health facilities may be the reason for lesser frequency in current study.

Despite high literacy in the region, road safety education is the need of the hour. It should be directed more towards vulnerable road users, who are frequently involved and injured in road traffic accidents. An integrated program of road safety education will be suggested primarily in co-ordination with department of Education. RTAs have been found to be following a certain pattern in term of time, day and season. Adequate attentions need to be given for specific time of day (especially weekends and in rainy/winter season to reduce overall burden of injuries and death due to RTAs. Further research is recommended to determine

agent, host and environmental factors to the mortality/morbidity due to TRAs. However strict enforcement of existing laws should be ensured with heavy penalties for violators. The licensing authorities should ensure that issuing licenses is based on scientifically sound principles rather than subjective assessments, emphasizing more on traffic rules and regulations and traffic control technologies.

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