

Injury Patterns & Determinants of Road Accidents in Rural Wardha.

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Date of Submission : 22-10-2018

Date of online Publication : 05-01-2019

Date of Acceptance : 14-12-2018

Date of Print Publication : 31-03-2019

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ABSTRACT

Introduction: WHO's report on road traffic accidents (2009) revealed 50% of deaths occur in vulnerable road users with higher rates in poorer economies of the world. Administrative records of Wardha district show the total number of road traffic accidents reported in the year 2011 were 601 including 165 fatalities and by 2012 midyear 441 cases including 116 fatalities. There is possibility of gross underreporting of road traffic accidents. Complexity of epidemiology of accidents as well as patterns of injuries suffered makes it an essential study determinant. **Objective:** To find out the severity & pattern of injuries sustained in RTA's. **Material and Methods:** Community based Cross sectional study was done in the villages of Wardha district (India). Sample size of 385 was estimated by Probability Proportional to Size sampling {PPS}. Variables like Pattern of injuries as fatal, non-fatal outcomes, type of injury sustained and sites of injury were enquired. **Result:** Abrasions were more at almost all times in the entire day with maximum during afternoon 50(45.0%), 20.7 % showed alcohol influence, 36.8 % suffered injuries to upper limb. **Conclusion:** Alcohol, over speeding is more dangerous on city roads, abrasions and lacerations were common injuries, fractures and crush injuries were less common. 20.7 % chances of Accidents under influence of Alcohol, most of them had motor driving license. Majority of accidents were non-fatal. Fractures were more common in motorized 4 wheeler occupants. Stones, animals on roads and defect on roads also played major role in accidents. Lack of visibility on the road had significantly increased the risk of fatal injuries.

Key Words: Road traffic accidents; Pattern of injury; Road safety

INTRODUCTION

By various accounts, the first injury crash was supposedly suffered by a cyclist in New York city in 1896 and the first fatality of a pedestrian in London, hit by a four wheeler.¹ Due to the fast pace of modernization, the requirement of a vehicle for transportation epidemic situation of injury everywhere including developing countries.² It is killing nearly 1.3 million people annually that too in low and middle income countries, it is 20 per hundred thousand population in middle income countries and 10 per hundred thousand population in high income countries. It is ninth leading cause of death, which may be the fifth leading cause of death by 2030.³ In 2016 India recorded 150785 deaths in road accidents, while in 2017 the fatal accidents were 147913⁴

The geographical and climatic conditions are different across our country and we have variety of roads, the travel pattern of people is different. The absence of scientific transport environment and human safety policies is increasing the burden on society.⁵ In 2009 WHO published a report on road traffic accidents 50% of death occurs in vulnerable road users i.e. in motorcyclists, cyclists and pedestrians, it is higher in the poorer

economies of the world.^{6, 7} Beyond the enormous suffering, family faces poverty as crash survivors and their families struggle to cope with the cost of medical care and rehabilitation and loss of the family breadwinner.⁷ Road safety has begun to receive some importance, as news of road crashes are beginning to become day to day concern.⁸

Administrative records in Wardha district where the present Community based Cross-sectional study is undertaken, shows the total number of road traffic accidents reported in Wardha in the year 2010 were 657 with 185 fatalities, in 2011 were 601 including 165 fatalities and by 2012 midyear 441 cases including 116 fatalities. This data signifies that there could be gross underreporting of the road traffic accidents. Patterns of accidents are needed to be studied for prevention and policy making. Pedestrians or victims with minor injuries do not report their accidents; a lot of it goes unreported and unseen. An accident can result in losing daily wages, spending out of pocket for treatment and hospitalization and if fatal, scattering an entire family as their bread winner and most productive family member is lost. So

Table 1: Type of injury wise distribution with time of accident

Type of injury	Time of accident				TOTAL
	06.00 Am-12.00Noon	12.01Noon – 05.59Pm	06.00 Pm-11.59 Pm	12.00midnight – 05.59 Am	
Abrasions Number (%)	32(28.8)	50(45.0)	27(24.3)	2(1.8)	111(50.4)
Lacerations Number (%)	3(15.0)	5(25.0)	10(50.0)	2(10.0)	20(9)
Fractures Number (%)	7(15.9)	19(43.2)	17(38.6)	1(2.3)	44(20)
Crush injuries Number (%)	5(19.2)	6(23.1)	15(57.7)	0	26(11.8)
Contusions Number (%)	0	0	0	4(100.0)	4(1.8)
Others Number (%)	0	9(60.0)	6(40.0)	0	15(6.8)
Total Number (n=220)	47(100)	89(100)	75(100)	9(100)	220(100)

this study was conducted with the objective to find out the severity & pattern of injuries sustained in RTA's

degree of significance was established as p-value < 0.05 was considered as significant.

MATERIAL AND METHODS

This was a Community based Cross sectional study done in the villages of Wardha district situated in Central India between 2010 and 2012. The sample size of 385 was estimated by Probability Proportional to Size sampling {PPS}this, is a method of sampling from a finite population in which a size measure is available for each population unit before sampling and where the probability of selecting a unit is proportional to its size.⁵ Ethical approval for the study was granted by the Institutional Ethics Committee of Datta Meghe Institute of Medical sciences, India. A Verbal informed consent was obtained from the individual adults. For minors, verbal informed consent was obtained from the parents/guardians.

The data was collected by the use of a structured interview. Information concerning the type of accident met by the victim may be fatal-leading to death within 30 days of the accident or non-fatal sustaining minor, moderate, severe injury but not causing fatality/hospitalization for more than 30 days. Pattern of injuries as fatal, non-fatal outcomes, type of injury sustained and the sites of injury, potentially unsafe conditions due to faulty roads, environmental factors, speeding, Potentially unsafe acts, potential error in judgement, human information about road safety and attitudes regarding traffic rules

Operational definition used: A road traffic accident (RTA) is any injury due to crashes originating from, terminating with or involving a vehicle partially or fully on a public road.^[6]

Inclusion criteria: Individuals who have met with a road traffic accident in the past 1 year and willing to give verbal consent for the interview.

Data collected was entered in Microsoft Excel 97-2003 worksheet and was analyzed using EPI-Info version 3.5.4. Descriptive statistics like mode, frequency and percentage were used. Chi-square, p-value were calculated and

RESULTS

Table 2: Alcohol influence and type of accident

Type Of Accident: Fatal/Non-Fatal	Alcohol Influence		
	Yes	No	Total
Fatal No. (%)	3 (15.0)	17 (85.0)	20 (5.8)
Non-Fatal No. (%)	52 (16.1)	270(83.9)	322 (94.1)
Total (n=342)	55(100)	287(100)	342 (100.0)

*57 consist of fatal cases, housewives and pediatric age group.

Table 3 : Relation between type of vehicle and type accident

Details of vehicle	Fatal Number (%)	Non fatal Number (%)	Total
Bicycle	7(20)	56(16.8)	63 (17.1)
Cycle rickshaw	4(11.4)	2(0.6)	6 (1.6)
Bullock cart	1(2.8)	2(0.6)	3 (0.8)
Motorized 2 wheeler	15(42.8)	204 (61.2)	219 (59.5)
Motorized 3 wheeler	2(5.7)	12(3.6)	14 (3.8)
Motorized 4 wheeler	3(8.5)	34(10.2)	37 (10)
Others	3(8.5)	23(6.9)	26 (7)
Total	35(100)	333(100)	368*(100)

*Rest were pedestrians or victims whose vehicle details were unknown.

Table 4 : Site of injury

Site of injury	Number	%
Head, neck, face	133	20.8
Thorax	15	2.35
Abdomen	9	1.41
Upper Limb	235	36.8
Lower Limb	225	35.3
Others	20	3.13
Total	637*	100%

*in the total 385 victims, most of the victims had injuries at multiple sites hence the total of 637

Time and type of injury

The relationship between type of injury sustained and the time of injury. Abrasions were more at all most all times in the entire day i.e. 06.00 Am-12.00Noon i.e.morning hours 32(28.8%), in the afternoon 50 (45.0%), and

Table 5: Relation between Pattern of Injury and type of vehicle

Type of vehicle	Abrasions Number (%)	Lacerations Number (%)	Fractures Number (%)	Crush injuries Number (%)	Contusions Number (%)	Others Number (%)
Bicycle, Cycle rickshaw, Bullock cart	35(31.53)	1(5)	5(11.3)	6(23)	0	1(6.6)
Motorized 2 wheeler	1(0.9)	1(5)	3(6.8)	1(3.8)	0	3(20)
Motorized 3 wheeler	9(8.1)	0	2(4.5)	5(19.2)	4(100)	3(20)
Motorized 4 wheeler	66 (59.4)	18(90)	34(77.2)	14 (53.8)	0	8(53.3)
Total (n=220)	111 (100)	20 (100)	44 (100)	26 (100)	4 (100)	15(100)

Mode of transport of victims

evening times 27(24.3). Lacerations were 3 (15%) in morning hours from 6-12 noon, 5 (25 %) in the afternoon, highest in the evening from 6 pm to 11.59 pm and 2 (10 %) at late night. Fractures were mostly seen in the afternoon 12-5.59 pm, 19(43.2), then at evening time 6-11.59 pm, 17(38.6 %), and 7(15.9 %) in the morning hours. Crush injuries were maximum 15(57.7%) found in between 6-11.59 pm followed by afternoon 12.01Noon – 05.59Pm, 6(23.1 %) and morning hours 5(19.2%). Contusions were seen only in 4 cases during midnight till dawn. (Table 1)

In this study out of 385 victims, 17 were pedestrians, whose vehicle details were unknown. 7(20%) were bicycles, 4(11.4%) were cycle rickshaws, 1(2.8%) bullock carts, 15(42.8 %) were motorized 2 wheelers, 2(5.7%) were motorized 3 wheelers, 3(8.5%) were motorized 4 wheeler, and 3(8.5%) were other vehicles involved. 347 were non-fatal cases out of which details of 14 were pedestrians or victims whose vehicle details were unknown. 56(16.8%) were bicycles, 2(0.6%) were cycle rickshaws, 2(0.6%) bullock carts, 204(61.2%) were motorized 2 wheelers, 12(3.6 %) were motorized 3 wheeler, 34 (10.2 %) were motorized 4 wheeler, and 23(6.9 %) others vehicles involved. (Table 3)

Accidents under influence of Alcohol

Type and pattern of injuries

Fatal accidents were 20 in number and those with alcohol influence were 3(15%) out of 342 cases and 52 cases were either homemakers and patients who are considered as non-consumers of alcohol and are always at back seat(Table 2) The effect of alcohol influence at the time of accident on the severity of injury in the accident. The total number of victims who consumed alcohol were 41 out of 198 those who were drivers and percentage wise it is 20.7%, 21.3 % i.e 23 victims had suffered abrasions, 9(21.9%) had lacerations, 4 (9.7%) had Fractures, 5(12.19 %) had crush injuries. Victims who were not under alcohol influence showed the following results 85(54.1 %) victims had suffered abrasions, 9(5.73%) had lacerations, 31(19.7%) had Fractures, 14(8.9%) had crush injuries while 4 (2.5%) had contusions. (Table 3)

In fatal cases maximum were lacerations 10(2.63%) and fractures in 9(2.39%) patients, in non-fatal cases abrasions and lacerations were common 64.2% and 32.8%. The maximum victims had injuries over upper limb 235 (36.8 %), 225 (35.3%) had injuries over lower limbs. About 133 (20.8 %) victims had injuries over head, neck and face while 15 (2.3%) were injured over thorax, 9 (1.4 %) over abdomen. Most of the victims had multiple injuries involving at least 2 or 3 of the body sites. (Table 4)

Status of Vehicle driving license

Fractures constituted maximum amongst the accident patterns accounting for 77.2 % observed among the motorized4 wheelers. While abrasions were maximum in Motorized 4 wheeler drivers (59.4 %) followed by Bicycle, Cycle rickshaw & Bullock cart drivers (31.5 %). Crush injuries were observed more in motorized 4 wheelers too followed by Bicycle, Cycle rickshaw, Bullock cart. Motorized 4 wheelers accounted for varied pattern of injuries like Abrasions, Lacerations, Fractures, Crush injuries, Contusions and others. (Table 5)

13 victims out of the 204 license holders met with a fatal accident and 191 (77.3%) had a non-fatal accident. While all i.e. 56 of the non-license holders met with a non-fatal accident. (Table 4)

Visual defects in victims

Environmental factors and surroundings of site

The victims with visual defect who met with a fatal accident were 10 (38.5 %) and non fatal accident were 84 (26.2). while those who did not have any visual defect and met with a fatal accident were 16 (61.5 %) and non fatal accident were 237 (73.8 %). (Table 5)

Use of Mobile during Accident

Among the 38 fatal accidents, 14 of the victims were travelling in dark, while in non-fatal cases 107 were travelling in dark. Depending on number of occupants on two wheelers, fatality was 55.6% and in non-fatal group it was 52.2 %, 18 victims had fatal injuries out of 271 victims travelling on two wheelers.

Out of 290 victim 31(10.69%) were using their mobile phone at the time of accident and 259(89.31%) were not using mobile phone during their accident.

Out of 8 fatal cases, informants have stated that there were rocks and stones on the road; while in non-fatal cases 168 (49.1 %) said the same.

The data regarding animals and plants on the road in 342 non-fatal cases 62 (18.1%) victims said that there were animals /plants on the road and a cause of accidents.

Out of the total 374 cases 30 were fatal accidents while 344 were non-fatal. Among the fatal accidents 19 (63.3) took place on cemented roads while 11 (36.6) were met with on non-cemented roads.

Among the non-fatal accidents 179 (52) were on cemented roads and 165 (47.9) were on Uncemented/ tar roads. In 199 cases 197 non-fatal accident victims admitted to defect in road design and layout were a cause of the accident. (Table 6) In 108 (30.7 %) cases visibility on the road was poor leading to accidents. While 244 (29.3) felt the visibility was good. There was presence of plants and animals on the road were responsible for 62 (17.7 %) of the road accidents.

Among the factors analyzed for association with severity of injury, the type of vehicle (2/3/4 wheeler) and visibility on road were observed to be independently associated with fatal injury. Also it can be concluded that good visibility on the road has significantly less risk (0.05) of fatal injuries. (Table 8)

DISCUSSION

In the present study it is seen that from the total 385 accident victims, 9 victims had sustained zero injuries from a non-fatal accident. From the rest 376 cases, 10.1 % victims met with fatal end, i.e. leading to death within 30 days of the accident while 89.9 % had a non-fatal accident. The information was elicited from the victim's kin as well as witnesses. Quite close were the findings of Olukoga A (2008) ¹¹ stating the fatalities as 17% and the majority were among pedestrians who were 24% of the casualties. Eric OM (2011) ¹² found the Fatality rate as 0.8% and Chaudhary B L Et al (2005) ¹¹ found 25.6 % fatality in their study.

Our study found in 36.8 % accidents upper limb was the site of injury, followed by lower limb (35.3 %). Head, neck and face injuries were seen in 20.8 % victims, while thorax abdomen and other injuries accounted for 6.9 %, Jha N et al (2003) ¹⁴ reported that among the various injuries, the limbs and the face were the commonly affected areas to suffer external injuries. Head injuries were the commonest form of internal injuries seen in the victims (34.1%). These injuries were common among bicycle riders, pedestrians and riders of motorized two wheelers. The commonest site for fracture was the lower limbs (43.4%) and Esiyok B et al (2005) ¹⁵ observed that the most frequently affected body part was lower extremities and 73.6% of lesions taken into account in estimation of the rate of disability were located in the pelvis and lower extremities. While Bener A et al (2009)

¹⁶ observed that Head injury (33.3%) was more common with light vehicle crashes. Neck injuries were more common with Pickup and SUVs (44.7%). Most of the injured drivers were hospitalized (97%) for their injuries. Eric OM et al (2011) ¹² approximately 19% of the road crash victims sustained severe injury. Most (69%) of the injuries sustained among study victims were to the head and neck region followed by the lower (64%) and upper extremities (23%). Among those who sustained head injury (n=15), 73% were vulnerable road users. The commonest site of fracture was lower limb 88 (46.3%) followed by upper limb 47 (24.7%) and skull 25 (13.2%). Other sites were spine 12 (6.3%), ribs 11 (5.8%) and pelvis 7 (3.7%). The severity of injury according to category of road users showed that two (1.6%) drivers, five (2.9%) vehicle occupants and one (2.1%) pedestrian have severe injuries. There is no significant association between severity of injuries and category of road users.

Conclusion: The study concludes that alcohol, over speeding, time of the day, type of vehicle are just a few of the multiple determinants of accidents leading to different types of injuries fatal and non-fatal. There were one fourth chances of Accidents under influence of Alcohol and most of them suffered from abrasions, majority of the victims were license holders, there was a lesser role of visual defects in these accidents. Mobiles were not culprit in most of the cases, most often the victims were using motorized two wheelers, lacerations and abrasions were most common in fatal and non-fatal cases, and fractures were more common in motorized four wheeler occupants. Rocks, stones, animals on roads, defect in road designs also played major role in accidents. It can be concluded that good visibility on the road has significantly less risk of fatal injuries.

Recommendations: A multipronged approach is necessary to control the road accidents.

Safer roads and mobility- it is important to raise the safety and protective quality of road networks for the benefit of all road users especially the most vulnerable i.e. pedestrians, bicyclists and motor cyclists. Improvement in the existing road infrastructure to meet the mobility and access need of all users

Road safety management- rural roads are generally not tarred and non-cemented. These mud roads do not give a good tyre grip, causing a lot of accidents.

Improve the post-crash response so that the victim can be easily and well in time be transported to a health facility and given quality of care.

Conclusion

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Conflict of Interest : None

Source of funding support: Nil

How to cite this article: Pramita Muntode Gharde, Vasant V Wagh, Abhay Mudey, Guddi Laishram, Shashank Gotarkar. Injury Patterns & Determinants of Road Accidents in Rural Wardha.. Nat J Res Community Med 2019;8(1): 10-14.

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