

## A Cross Sectional Study to Assess the Demographic Profiles of Victims of Fatal Road Traffic Accidents

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### Abstract

**Aim:** Demographic profiles of victims of fatal road traffic accidents in Bihar population

**Methods:** The cross sectional study was conducted in the Department of Forensic Medicine and Toxicology, SKMCH, Muzaffarpur, Bihar, India for 1 year. Total 200 dead bodies of victims of road traffic fatalities brought to mortuary for medico-legal post mortem examination in the department of forensic medicine.

**Results:** Age group of 21-30 years comprising 28% (56 cases) followed by age group 31-40 years i.e.20% (40 cases). Male victims accounting for 83.50% (167 cases) of road traffic accidents as compared to female victims 16.5% (33 cases). 61.50% (123 cases) of road traffic accidental victims were belonging from urban area whereas 38.50% (77 cases) were belonging to rural area. 37 cases (18.50%) of road traffic accident had occurred in between 6am to12pm while 92 cases (46%) of road traffic accidents had occurred during 12pm to 6pm. In 54 cases (27%), road traffic accidents had occurred during 6pm to12am while 17 cases (8.50%) of road traffic accidents occurred during 12am to 6am. Two wheelers were offending vehicle in 24 cases (12%), three wheelers were in only 2 cases (1%) and four wheelers and above were in 112 cases (56%) of road traffic accidents. 55 cases (27.50%) and 4 cases (2%) of road traffic accidents had occurred because of skidding of two wheelers and four wheeler respectively. Four wheeler and above indicates vehicles having four or more than four wheels that includes car, buses, truck, tractor, etc. 90 cases (45%) of road traffic accident victims were two wheeler riders, 28 cases (14%) were pillion rider of two wheeler, 6 cases (3%) were four wheeler driver while 9 cases (4.50%) were passengers of four wheeler and above. 12 (6%) cases of accident victims were bicycle rider, 2 cases (1%) were bullock cart driver and 53 cases (26.50%) were pedestrian. 85 cases (42.50%) of road traffic accidents were transported to the nearest hospital by police mobile van (PMV), 31 cases (15%) were by ambulance, 50 cases (25%) by auto, 25 cases (12.50%) by private and 9 cases (4.50%) by two wheeler. Helmet was applicable in 118 cases (59%) but none of victim used helmet as safety measure.

**Conclusion:** The road accidents are occurring most often due to the reckless and speedy driving of the vehicles, violation of traffic rules, overburdened public transport vehicles, poor maintenance of the vehicles.

**Keywords:** RTA, Mortality, Injury

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## Introduction:

A road traffic injury is any injury caused due to crashes originating, terminating or involving a vehicle partially or fully on a public highway.[1] also defined as a fatal or non- fatal injury incurred as a result of a collision on a public road involving at least one moving vehicle. Children, pedestrians, cyclists and the elderly are among the most vulnerable of road users.

It is a major yet neglected public health problem around the world, in spite of being a preventable one. Increase in the requirement of vehicles has resulted in an epidemic like condition in road traffic accidents.[2] The role of agent, host and environment can't be defined that simply here as it is in cases of communicable diseases.[3]

Accidents are the 6<sup>th</sup> leading cause of deaths worldwide, accounting for about 60% of deaths in the young population. The western pacific region shows maximum mortality i.e. 77% of the mentioned deaths. It is the leading cause of death for young population between 15 to 40 years of age (around 60%) of which 77% deaths occur in males and most of the deaths are in Western Pacific Region.[4]

According to World Health Organization report, road traffic injuries kill around 1.3 million people annually, it is being estimated that this rank could rise to 5<sup>th</sup>. Approximately 90% of these deaths occur in low- and middle-income countries.[4,5]

As mentioned, mortality is around 3 times more in males in cases of road traffic accident.[4,6] The increase in the incidence of road traffic accidents in India has been observed to be 8% per year for last ten years and it is not showing any signs of reduction,

reason behind it might be, vehicle sales growth per year in India has reached to 6% per year.[7]

India National highways comprises of 2% of total world road network and 40% of world's total traffic runs on Indian roads and it accounts for 65% of the causalities in world.[8] The actual figures are necessary for data comparison.[9] Our health systems are burdened by large number of road traffic injuries.[10-15]

## Material and methods

The cross sectional study was conducted in the Department of Forensic Medicine and Toxicology, SKMCH, Muzaffarpur, Bihar, India for 1 year.

## Methodology

Total 200 dead bodies of victims of road traffic fatalities brought to mortuary for medico-legal post mortem examination in the department of forensic medicine. Decomposed bodies and cases with doubtful history were excluded from the study. Detailed history was taken from relatives as well as from eye witness if available at the time of autopsy. Necessary information was also gathered from inquest report, relatives and the hospital treatment record. A detailed pro-forma for the purpose of recording history, epidemiological data and the details of injuries etc. was prepared for the filling observation of the present study. The information thus collected, was statistically analysed.

## Results

Age group of 21-30 years comprising 28% (56 cases) followed by age group 31-40 years i.e. 20% (40 cases). Age groups least affected were 1-10 years. Male victims accounting for 83.50% (167 cases) of road traffic accidents as compared to female victims 16.5% (33 cases). Male to female ratio in the study was 5.06:1 (Table 1). 61.50% (123 cases) of road traffic accidental victims were belonging from urban area whereas 38.50% (77 cases) were belonging to rural area. 37 cases (18.50%) of road traffic accident had occurred in between 6am to 12pm while 92 cases (46%) of road traffic accidents had occurred during 12pm to 6pm. In 54 cases (27%), road traffic accidents had occurred during 6pm to 12am while 17 cases (8.50%) of road traffic accidents occurred during 12am to 6am. Two wheelers were offending vehicle in 24 cases (12%), three wheelers were in only 2 cases (1%) and four wheelers and above were in 112 cases (56%) of road traffic accidents. 55 cases (27.50%) and 4 cases (2%) of road traffic accidents had occurred because of skidding of two wheelers and four wheeler respectively (Table 2) Four wheeler and above indicates vehicles having four or more than four wheels that includes car, buses, truck, tractor, etc. 90 cases (45%) of road traffic accident victims were two wheeler riders, 28 cases (14%) were pillion rider of two wheeler, 6 cases (3%) were four wheeler driver while 9 cases (4.50%) were passengers of four wheeler and above. 12 (6%) cases of accident victims were bicycle rider, 2 cases (1%) were bullock cart driver

and 53 cases (26.50%) were pedestrian (Table 3). 85 cases (42.50%) of road traffic accidents were transported to the nearest hospital by police mobile van (PMV), 31 cases (15%) were by ambulance, 50 cases (25%) by auto, 25 cases (12.50%) by private and 9 cases (4.50%) by two wheeler. Helmet was applicable in 118 cases (59%) but none of victim used helmet as safety measure. Helmet was not applicable in 82 cases (41%) as these victims were driver of four wheeler, driver of bullock cart, bicycle rider, occupants of four wheelers and above or pedestrians. 37 cases (18.50%) died on spot or died within one hour of accident. 44 cases (22%) survived for 1 to 6 hours, 9 cases (4.50%) for 6 to 12 hours, 23 cases (11.50%) for 12 to 24 hours, 22 cases (11%) for 24 to 48 hours, 29 cases (14.50%) for 48 to 96, 11 cases (5.50%) for 4 to 7 days and remaining 25 cases (12.50%) survived for more than 7 days after the road traffic accidents. Mean survival time  $\pm$  SD = 145.73  $\pm$

293.31 Median survival time = 20 hours and Range is 0- 1800 hours (table 4). 133 cases (66.50%) of road traffic accident victims died due to head injury as a cause of death, 8 cases (4%) as injury to chest, 4 cases (2%) as injury to thorax, 28 cases (14%) as Haemorrhage and shock, 17 cases (8.50%) as poly-trauma

and 10 cases (5.0%) as sepsis secondary to injuries sustained. Poly-trauma means severe involvement of two or more body region (Table 5).

**Table 1: Age wise and gender wise distribution of cases**

Age(years)	Male	Female	Total	Percentage
1 to 10	3	0	3	1.5
11 to 20	18	2	20	10
21 to 30	45	11	56	28
31 to 40	32	8	40	20
41 to 50	31	3	34	17
51 to 60	23	8	31	15.5
>60	15	1	16	8
Total	167	33	200	100

**Table 2: Distribution of cases according to offending vehicle**

Offending vehicles	Cases	Percentage
Two wheeler	24	12
Three wheeler	2	1
Four wheeler and above	112	56
Skidding of two wheeler	55	27.5
Skidding of four wheeler	4	2
Dash to road divider	3	1.5
Total	200	100

**Table 3: Distribution of cases according to position of victim at the time of accident**

Accidental victims	Case	Percentage
Two wheeler rider	90	45
Pillion rider of two wheeler	28	14
Four wheeler driver	6	3
Passengers of four wheeler and above	9	4.5
Bicycle rider	12	6
Bullock cart driver	2	1
Pedestrian	53	26
Total	200	100

**Table 4: Distribution of cases according to survival period**

Survival time	Cases	Percentage
Spot death/< 1hrs	37	18.5
1 to 6hrs	44	22
6 to 12hrs	9	4.5
12 to 24hrs	23	11.5
24 to 48hrs	22	11
48 to 96hrs	29	14.5
4 to 7days	11	5.5
>7days	25	12.5
Total	200	100

**Table 5: Distribution of cases according to cause of death**

Cause of death	Cases	Percentage
Head injury	133	66.5
Injury to chest	8	4
Injury to abdomen	4	2
Haemorrhage and shock	28	14
Poly-trauma	17	8.5
Sepsis	10	5
Total	200	100

## Discussion

In our study the peak incidence was seen in age group of 21- 30 years comprising 28% (56 cases) followed by age group 31-40 years i.e.20% (40 cases). Age groups least affected were 1-10 years. There was predominance of male victims accounting for 83.50% (167 cases). Male to female ratio in the study was 5.06:1.

Chaudhary B et al[16] observed that in the age group analysis, maximum incidence was in age group of 20-29 years, comprising 31.20% cases, this was followed by 30-39 years age group, having 27.20% cases. 83.20% cases were males, and 16.80% cases were females. Singh H and Dhatarwal SK[13] found that commonest age group involved was 21-30 years (27.3%) followed by 31-40 years (20.6%) and 11-20 years (17.3%). Males out-numbered females in ratio 9:1.

This study is in accordance with above author along with Rautji R et al,[9] Kamdar B et al,[11] Kumar A,[19]Shinde J et al,[26] Singh Y et al,[15] Jha N et al,[14] Sharma D et al,[22] Patel DJ et al,[18] Tandle R et al,[23] Honnuagar RS et al[24] and Jakkam S.[28]

The reason for more young adults (21-40 years) involvement in both the gender may be rash driving, more excitement, and more average speed. Persons in extremes of the age usually remain indoors due to age related illness and general condition. The reason for the male majority is many of them died due to rash driving, average speed of vehicles are more resulting into serious injuries.

Maximum numbers of victims of road traffic accidental deaths were belonging from urban area 61.50% (123 cases).Study conducted by Singh Y N et al[15] reported that frequency of road traffic accident was more (43.42%) in urban areas than semi urban (39.58%) and rural areas (16.98%). Jakkam S[28] found

that many of the deceased were form sub-urban population 128 (43.10%), people from rural areas were 87 (29.29%) and the remaining 82 (27.61%) are from urban population

The findings in our study coincide with Singh Y et al,[15] Wasnik R[25] and partly with Jakkam S[28] studies. The reason for this is that area in which present study conducted had maximum fatalities from urban area and due to good condition of road, average speed of vehicles was more in this region.

Maximum number of road traffic accidents had occurred during 12pm to 6pm i.e. 46% (92 cases). Least number of cases of road traffic accidents was seen during 12am to 6am i.e. 8.50%, (17 cases) i.e. mainly night hours. Kyada H et al[27] observed that 114 (38.26%) cases were during afternoon time between 12.01 p.m. to 6.00 p.m. followed by 95 (31.88%) cases in morning time of 6.01 a.m. to 12.00 noon. Pathak A et al,[20] found peak timings of occurrence of road traffic accident were 9-12 in the morning and 6-9 in the evening. Jha N et al[14] found that the highest number of accidents occurred from 4 PM to 5 PM (8.9%) to 6 PM to 7 PM (7.3%).

Our study is in accordance with the study conducted by Kyada H et al[27] and Jha N et al[14] and partly with Atkins R.M et al[12] and does not match with Singh Y et al,[15] Pathak A et al[20] and Kumar A et al.[19] The reason for the peak incidence of accidents in day time (12pm to 6pm) is multi-fold and includes people hurried to reach to place of work, rush hours of traffic, rash driving, inadequate traffic control, hurry to return home and also intoxication.

Majority of offending vehicles were four wheelers and above accounting for 56% (112 cases) i.e., more than fifty per cent cases of road traffic accidents. Three wheelers were least involved 1% only (2 cases). Four wheelers and above were most common offending vehicle responsible for road traffic

accident. Similar findings were seen by Jerath BK et al,[10] Singh H and Dhattawal SK,[13] Jha N et al,[14] Singh Y et al,[15] Kaul A et al[17] and Wasnik R.[25] The reasons for four wheelers and above vehicles for common offending vehicles are, average speed of four wheelers and above are more. They are much heavier as compared to two wheelers or other light vehicle causing greater damage, resulting into fatal injuries.

Maximum number of accidental victims were two wheeler riders 45% (90 cases) followed by pedestrian 26.50% (53 cases), and pillion rider of two wheeler 14% (28 cases). Rider and pillion rider of two wheelers comprised total 118 victims of road traffic accidental deaths i.e. 59%. Pathak A et al[20] found that Incidence of deaths due to road traffic accident was maximum (49.37%) in two wheeler riders followed by pedestrians in 32.91% cases while Sharma D et al[22] found that out of total 236 drivers/riders, 75% were two wheeler riders followed by 10.59% four-wheeler riders/drivers and 10.59% bicyclists. Present study is in accordance with studies of Pathak A et al[20] and Sharma D et al.[22]

Riders and pillion riders of two wheelers are more vulnerable for road traffic accidents because more chances of injuries to exposed and unprotected body parts.

Police mobile van (PMV) was major mode of transportation accounting for 42.50% (85 cases) followed by auto 25% (50 cases) and ambulance 15.50% (31 cases). Two wheelers were least preferred mode of transportation 4.50% i.e. 9 cases. Rautji R et al[9] in his study found that common mode of transportation of injured victims to the nearest hospital by police control room (PCR) in 50%, 35% cases were transferred by taxi, 11% by private vehicle and 4% by ambulance. The results of our study match with above study. In both the city, major

mode of transportation was police mobile van.

None of accidental victim used helmet as a safety measure even though it was applicable in 59% (118 cases) of victims of road traffic accidental death. Out of 118 victims of road traffic accidents, 72 (61.01%) victims died because of head injury alone while in 13 (11.01%) victims head along with other body region was involved. Remaining 33 (27.96%) victims died because of injuries to body region other than head. Pathak A et al[20] observed that in two wheeler accidents most of the victims (87.17%) were not wearing any protective helmets at the time of incidence while in only 12.83% cases the victims died due to fatal head trauma even they were wearing protective helmets. Shivakumar B et al[21] seen that majority of victims did not use helmets (74%) and only 6% used helmets.

The use of helmet may protect the external injuries to head and thereby internal damages up to certain extents. But it cannot prevent concussive injuries in head injuries. (Mohan D et al[6] and Kelly P et al[7]).

22%(44 cases) of victims of road traffic accidents died in between 1 to 6 hours of interval while 18% (36 cases) of victims died on spot or within one hour of road traffic accident i.e. 40% of victims died within 6 hours after the road traffic accidents. Only 12.50% (25 cases) of victims survived for more than 7 days.

Sharma B R et al[8] found that, 116 (27.23%) victims of road traffic accidents died within one hour of accident, 99 (23.24%) survived for one to six hours. Survival period of 3 days to 1 week was recorded in 68 (15.96%) cases, whereas 38 (8.92%) survived for more than one week. Shinde J et al[26] found that 68.38% deaths occurred within 24 hours of accident, 15.38% died on spot, 18.52% between 1-7 days, 5.12% after 7 days and in 7.98% status was unknown.

Present study findings are partly comparable with the above studies along with Kamdar BA et al,[11] Kumar A et al,[19] Shinde J et al[26] and Rautji R et al.[9]

The reason for major mortality within the 6 hours of road traffic accidents were most of the injuries were too severe in nature to seek treatment, most of them died on spot or during transportation of victims to the hospitals.

Head injury was commonest cause of death in victims of road traffic accident which was responsible for death of total 56% cases followed by poly-trauma (18%) and Haemorrhage and shock (15%) as shown in table number 4. Jerath BK et al[10] found that head and face involved in 50% cases, abdomen and spine in 25% cases and chest in 20.8% cases. Kaul A et al[17] found that head injury alone was the cause of death in 277 cases (29.15%).Rautji R et al[9] found the major cause of death was head injury compromising 43.5% of the total cases.

The present study is in accordance with above studies and also matches with studies of Chaudhary B et al,[16] Wasnik R[25] and Singh H and Dhatarwal SK.[13] The reason for head injury as the commonest cause of death is that head being most vital part of the body which is commonly involved. Head injury is always serious and which may cause death in ordinary course of nature.

### Conclusion

The road accidents are occurring most often due to the reckless and speedy driving of the vehicles, violation of traffic rules, overburdened public transport vehicles, poor maintenance of the vehicles. Most of the road traffic accidental deaths and injuries are preventable. A wide range of effective road safety interventions and a scientific system approach to road safety is essential to tackle the problem. There should be proper approach to address the traffic system as a

whole and look into interactions between vehicle, road users, and road infrastructure to identify solution. Few recommendations for the better implementation of the same are as follows.

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