Demographic profiles of victims of fatal road traffic accidents in central Indian population: A cross sectional study

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Abstract
The study was carried out in the department of forensic medicine at Government College and hospital, Nagpur over a period of one and half year on 200 dead bodies of victims of road traffic fatalities brought to mortuary for medico-legal post mortem examination. The purpose of study is to analyse the magnitude of deaths due to road traffic accidents and to study the demographic profiles, so the preventive measure can be undertaken. The peak incidence was seen in age group of 21-30 years; males comprised a majority and constituted 83.50% cases. 61.50% cases were belongs to urban area and in 56% cases four wheeler and above were offending vehicle. Majority of victims of road traffic accidents died within 6 hours and head injury was most common cause of death which accounts total 56% cases of road traffic accident deaths.
The study emphasis that there should be multi-disciplinary approach and effective road safety interventions to reduce the incidence of RTA, thereby reduction in injuries and deaths on the roads.

Keywords: Road traffic accidents (RTAs), Victims, Demographic profile.

Introduction
Motorization has enhanced the lives of many individual and societies but thebenefits have come with the price. Although the number of lives lost in road accidents in high income countries indicates a downward trend in recent decades for most of the world's population, the burden of road traffic injuries in term of societies and economic cost is rising substantially. According to World Health Organization (WHO), road traffic injuries are the sixth leading cause of deaths, disabilities and socio-economic losses in the young and middle-aged population.[1] Road traffic injuries also place a huge burden on the health sector in terms of pre-hospital care and acute rehabilitation.[2] In many countries, motor vehicle accidents rank first among all fatal accidents. Every year almost 1.3 million people die from road accidents in the world.[3] National institute of mental health and neurosciences, Bangaluru, revealed that nearly 60% of traumatic brain injuries are due to road traffic injuries.The risk of death is nearly 2.5 times more among unhelmeted riders compared with those wearing helmets.[4]
The data from National Crime Records Bureau, Ministry of home affairs, Government of India, accidental deaths in India 2012 shows that the rate of accidental deaths per thousand vehicles was highest in Bihar and West Bengal at 1.9 each followed by Himachal Pradesh (1.8) as compared to 1.0 at the national level.[5] The Aim and objective of study wasto study the demographic profile of victims of road traffic accidents and also to analyse the magnitude of deaths in central Indian population, so the preventive measure can be undertaken.

Materials and Methods
The cross sectional study was conducted from 1st January 2012 to 31st August 2013 on 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 at Government College and hospital, Nagpur a tertiary care teaching institute and hospital serving mainly to demands of community of central Indian population. The study was approved by institutional ethics committee. 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.

Observations & Results
During this study 200 cases of road traffic accidents brought for medico-legal post-mortem were studied and following parameters were analysed.

Age and gender wise distribution of case
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).

Region
61.50% (123 cases) of road traffic accidental victims were belonging from urban area whereas 38.50% (77 cases) were belonging to rural area (Fig. 1).

Time of incidence
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.

Offending vehicle
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.

Position of accidental victim at the time of accidents
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).

Mode of transportation of accidental victims
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 use
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.

Survival time
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 to12 hours, 23 cases (11.50%) for 12 to 24 hours, 22 cases (11%) for 24 to 48 hours, 29 cases (14.50%) for 48to 96, 11 cases (5.50%) for 4 to 7days and remaining 25 cases (12.50%) survived for more than 7 days after the road traffic accidents. Mean survival time ± SD=145.7 3± 293.31 Median survival time = 20 hours and Range is 0-1800 hours (table 4).

Cause of death
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 Haemorrage 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).

Table1: Age wise and gender wise distribution of cases

Age(years)	Male	Female	Total	Percentage
1 to 10	3	0	3	1.50
11 to 20	18	2	20	10.00
21 to 30	45	11	56	28.00
31 to 40	32	8	40	20.00
41 to 50	31	3	34	17.00
51 to 60	23	8	31	15.50
>60	15	1	16	8.00
Total	167	33	200	100.00

Table 2: Distribution of cases according to offending vehicle

Offending vehicles	Cases	Percentage
Two wheeler	24	12.00
Three wheeler	2	1.00
Four wheeler and above	112	56.00
Skidding of two wheeler	55	27.50
Skidding of four wheeler	4	2.00
Dash to road divider	3	1.50
Total	200	100.00

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

Accidental victims	Case	Percentage
Two wheeler rider	90	45.00
Pillion rider of two wheeler	28	14.00
Four wheeler driver	6	3.00
Passengers of four wheeler and above	9	4.50
Bicycle rider	12	6.00
Bullockcart driver	2	1.00
Pedestrian	53	26.00
Total	200	100.00

Table 4: Distribution of cases according to survival period

Survival time	Cases	Percentage
Spot death/< 1hrs	37	18.50
1 to 6hrs	44	22.00
6 to12hrs	9	4.50
12 to 24hrs	23	11.50
24 to 48hrs	22	11.00
48 to 96hrs	29	14.50
4 to7days	11	5.50
>7days	25	12.50
Total	200	100.00

Table 5: Distribution of cases according to cause of death

Cause of death	Cases	Percentage
Head injury	133	66.50
Injury to chest	8	4.00
Injury to abdomen	4	2.00
Haemorrhage and shock	28	14.00
Poly-trauma	17	8.50
Sepsis	10	5.00
Total	200	100.00

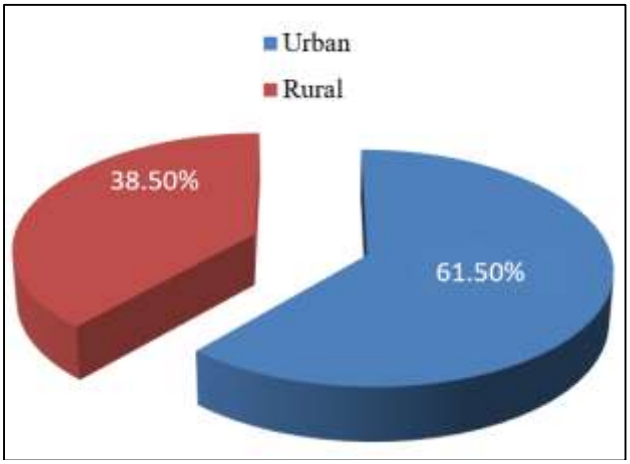

Fig. 1: Distribution of cases according to region

Discussion

Age and gender wise distribution of case

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 Dhattarwal 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.

Region

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.

Time of incidence

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.

Offending vehicle

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.

Position of accidental victim at the time of accidents

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.

Mode of transportation of accidental victims

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.

Helmet use

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 at el[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 at el[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]).

Survival time

22%(44 cases) of victims of road traffic accidents died in between 1to 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 1week 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.

Cause of death

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 Dhattarwal 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.

Prevention of RTA is a responsibility of various agencies and a multi-disciplinary approach will effectively reduce the incidence of RTA and reduction in injuries and deaths on the roads. All drivers should be properly trained and should possess a valid driving license. Educate the drivers and traveling public about traffic rules. Enforce traffic rules by the concerned authorities strictly.

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None.

Conflict of Interest

None.

References

1. Ministry of Health and Family Welfare. Integrated Disease Surveillance Project- Project Implementation Plan 2004-2009. NewDelhi: Government of India; 2004:1-18.
2. Gururaj G. Road traffic injury prevention in India. Bangalore: National Institute of Mental Health and Neuro Sciences, 2006; Publication No 56.
3. Park K. Park's Textbook of preventive and social medicine. 22nd ed. Jabalpur: Banarsidas Bhanot Publishers; 2013:374-5.

4. Head injuries and helmet: Helmet legislation and enforcement in Karnataka and India. National Institute of mental health & neuro sciences, Bengaluru; p-10.
5. Government of India, Ministry of Home Affairs. National Crime Records Bureau.Accidental Deaths and Suicides in India 2012.
6. Mohan D. Mechanics of head injury and politics of brain damage. *Curr Sci*. 1993;65(10):749-60.
7. Kelly P, Sanson T, Strange G, Orsay E. A prospective study of the impact of helmet usage on motor cycle trauma. *Ann Emerg Med*. 1991;20(8):852-6.
8. Sharma BR, Gupta M, Bangar S. NISS a valuable tool for trauma scoring on autopsy. *Pak J Biol Sci.* 2005;8(7):995-1000.
9. Rautji R, Bhardwaj DN, Dogra TD. The Abbreviated Injury Scale and its Correlation with Preventable Traumatic Accidental Deaths: A study from South Delhi. *Med Sci Law.* 2006;46(2).
10. Jerath BK, Malvea BP, Kawata K. Epidemiology of road accidents. *Indian J Public Health.*1967;XI(4).
11. Kamdar BA, Arden GP. Road traffic fatalities (review of 142 post mortem reports). *Postgrad Med J*. 1974;50:131-4.
12. Atkins RM, Turner WH, Duthie DB, Wilde BR.Injuries to pedestrians in road traffic accidents. *Br Med J*. 1998;297(3):1431-4.
13. Singh H, Dhattarwal SK. Pattern and distribution of injuries in fatal road traffic accidents in Rohtak (Haryana). *J Indian Acad Forensic Med*. 2004; 26(1), ISSN 0971-0973.
14. Jha N, Srinivasa DK, Roy G, Jagdish S. Epidemiological study of road traffic accident cases: A study from South India. *Indian J Community Med*. 2004;29(1).
15. Singh Y, Biragi K, Das K. An Epidemiological study of Road Traffic accident victims in medicolegal autopsies. *J Indian Acad Forensic Med*. 2005;27(3):166-9.
16. Chaudhary B, Singh D, Tirpude B, Sharma R, Meel V. Profile of road traffic accident cases in Kasturba Hospital of M.G.I.M.S, Sevagram, Wardha, Maharashtra. *Med-Leg Update.* 2005;5(4):127-33.
17. Kaul A, Sinha US, Kapoor AK, Pathak YK. An epidemiological study of fatal road traffic accidents in Allahabad region. *Indian J Forensic Med Toxicol.* 2005;3(1).
18. Patel DJ, Agnihotram G. Study of Road Traffic Accidental Deaths (RTA) in and Around Bastar Region of Chhattisgarh. *J Indian Aced Forensic Med.* 2005;32(2):110-2.
19. Kumar A, Lalwani S, Agarwal D, Rautji R, Dogra T. Fatal road traffic accidents and their relationship with head injuries: An epidemiological survey of five years. *Indian J Neurotrauma.* 2008;5(2):63-7.
20. Pathak A, Desania N, Verma R. Profile of Road Traffic Accidents & Head Injury in Jaipur (Rajasthan). *J Indian Acad Forensic Med*. 2009;30(1):6-9.
21. Shivakumar B, Shrivastava P, Shantakumar H. Pattern of head injuries in mortality due to road traffic accidents involving two-wheelers. *J Indian Acad Forensic Med.* 2010;32(3):239-42.
22. Sharma D, Singh U, Mukherjee S. A study on road traffic accidents in Anand-Gujarat. *Healthline.* 2011;2(2).
23. Tandle RM, Keoliya AN. Patterns of head injuries in fatal road traffic accidents in a rural district of Maharashtra- Autopsy based study. *J Indian Acad Forensic Med*. 2011;33(3).
24. Honnungar RS, Aramani SC, Kumar VAG, Kumar ATS, Jirli PS. An epidemiological survey of fatal road traffic accidents and their Relationship with Head Injuries. *J Indian Acad Forensic Med*. 2011;33(2).
25. Wasnik R. Analysis of fatal road traffic accidents in Nagpur (Maharashtra). *Med Leg Update.* 2012;12(1):68-9.
26. Shinde J, Jawale S, Lamb M, Tandale R, Wakade S. A study of fatal road traffic accidents in Aurangabad, Maharashtra. *Med Leg Update.* 2012;12(1):37-40.
27. Kyada H, Mangal H, Momin S, Vijapura M, Bhuva S. Profile of Fatal Road Traffic Accidents in Rajkot City. *J Indian Acad Forensic Med*. 2012;34(2):135-8.
28. Surender J. Pattern of injuries in fatal road traffic accidents in Warangal area. *J Indian Aced Forensic Med*. 2013;35(1):57-9.

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