



Deaths Due to Road Traffic Injuries- A Forensic Autopsy Study

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Abstract

Background: Injuries due to road traffic injuries (RTIs) depend upon various factors that include human, vehicle and environmental factors that plays a vital role before, during and after a fatal vehicular accident. Road traffic injuries involve high human suffering and monetary costs in terms of ultimately deaths, injuries and loss of potential income. **Aims and Objective:** The aims and objective of study was to study the incidence of death due to road traffic injuries, demographic profile including various contributory factors of victims and vehicles and to analyse the magnitude of deaths. **Material & Methods:** The present retrospective and cross sectional study was conducted in Forensic Medicine & Toxicology Department, Government Medical College, Amritsar. All the autopsies conducted on road traffic injuries victims during the period from Jan, 2016 to Dec, 2020 were studied. **Results:** Majority of cases taken up for study were males (80%) followed by females (20%), majority cases belonged to the age group of 21 -30 years (34.72%). The majority of cases (70.61 %) that met with road traffic injury happened at evening time period. Head injury was the cause of death in 42.45% cases followed by 33.88% cases having multiple injuries. **Conclusions:** Motorization though has enhanced the lives in this era but that has come up with some price. High priority is demanded towards the alarming rate of human loss due to RTIs. Awareness at every level including the strict formation of policies that would prevent such RTIs in future.

Keywords:- Road traffic injuries, Vehicular accidents, Road Safety, Pediatric deaths.

INTRODUCTION

The global rate of mortality resulting from Road Traffic Injuries (RTIs) has increased 46 percent since 1990.^[1] Current trends suggest that RTIs will become the seventh leading cause of death by 2030 unless action is taken.^[2] According to the WHO report, currently road traffic injuries are the leading cause of death for person aged between 5-29 years.^[3] Over the

past two decades, in the absence of effective road safety programs, mortality resulting from RTIs has increased steadily in developing countries contrasts with that in high-income countries (HICs), where road traffic fatalities are on a downward trajectory.^[4]

In India, the situation is much exacerbated as poor enforcement of traffic laws and shortsighted policies on the part of our policy

makers. Road traffic injuries involve high human suffering and monetary costs in terms of ultimately deaths, injuries and loss of potential income. Injuries due to RTI depend upon various factors that include human, vehicle and environmental factors that plays a vital role before, during and after a fatal vehicular accident. The trend is frightening and alarming that is leading to a heart wrenching situations everyday.^[5]

Aims and Objectives

The aims and objective of the study were to study the incidence of death due to road traffic injuries, demographic profile including various contributory factors of victims and vehicles, and analyze the magnitude of deaths in the northern region of Punjab so that preventive measures can be set up to avoid such situation.

MATERIAL AND METHODS

The present five years retrospective and cross sectional study was conducted in Forensic

Medicine and Toxicology Department, Government Medical College, Amritsar. All the autopsies conducted on road traffic injuries victims during the period from Jan, 2016 to Dec, 2020 were studied from the available data. Permission from the institutional ethical committee was not required as the study is retrospective and the available data from department was studied. Demographic and other variables regarding vehicles injuries and cause death were studied from the inquest papers, treatment records and post mortem reports. All the data was entered in preformed proforma and was analysed using statistical software.

Inclusion Criteria

All the death due to road traffic injuries.

Exclusion Criteria

Death that occurred other than road traffic injuries like rail accidents, air crash injuries or injuries due to fall.

RESULTS

Table 1: Year wise incidence of the cases of road traffic injuries.

Year	Total cases	RTI cases (%age)
2016	366	61(16.67%)
2017	347	55(15.85%)
2018	348	57(16.38%)
2019	353	32(9.07%)
2020	374	40(10.7%)
Total	1788	245(13.7%)

Table 2: Distribution of cases according to demographic profile(N=245).

Demographic Profile	No of cases (%)
Habitat	
Rural	123(50.2%)
Urban	55(24.45%)



Unknown	18(7.35%)
Marital status	
Married	138(56.33%)
Unmarried	89(36.32%)
Unknown	18(7.35%)
Religion	
Sikh	163(66.53%)
Hindu	37(15.1%)
Christian	23(9.39%)
Muslim	04(1.63%)
Unknown	18(7.35)

Table 3: Distribution of the cases with respect to gender and age.

Age (in years)	Male	Female	Total (%)
1-10	02	01	03(1.22)
11-20	15	01	16(6.52)
21-30	72	13	85(34.72)
31-40	64	10	74(30.2)
41-50	24	06	30(12.24)
51-60	13	08	21(8.57)
>60	06	10	16(6.53)
Total	196	49	245(100)

Table 4: Distribution of the cases according to the time of the accident.

Time of accident	No of cases	%age
8.01 AM - 4.00 PM	56	22.86
4.01PM - 12.00AM	173	70.61
12.01 AM - 8.00 AM	16	6.53
Total	245	100

Table 5: Distribution of cases according to the mode of transport.

Type of victim	No of cases	%age
Pedestrian	71	28.98
Two wheeler non-motor	19	7.76
Two wheeler motor	121	49.39
Four wheeler motor	19	7.76
Heavy vehicle	15	6.11
Total	245	100

Table 6: Distribution of the cases according to time between injury and death.

Time period	No of cases	%age
Brought dead	85	34.69



<6 hours	112	45.71
6-12 hours	24	9.8
12-24 hours	08	3.26
24-48 hours	09	3.67
48-72 hours	02	0.81
3-7 days	04	1.65
>7 days	01	0.41
Total	245	100

Table 7: Distribution of the cases to the region of injuries causing death.

Cause of Death	No of cases	%age
Head injuries	104	42.45
Neck injuries	07	2.86
Chest and Abdomen	49	20.0
Multiple Injuries/Polytrauma	83	33.88
Sepsis	02	0.81
Total	245	100

DISCUSSION

In the present study, the incidence of road traffic injuries (RTIs) deaths has shown a decrease in incidence in the years 2019 and 2020 [Table 1]. A similar fall in the number of cases was observed in the state of Punjab in regional statistical data. The probable reason initiation of a pilot project titled Accident Resolution Team-ART under which teams led by station house officers visited and inspected the black spots in their respective jurisdictions. As claimed by state police officials, the other probable reason was increased awareness programs organized by state police. The complete lockdown for three months due to covid 19 contributed to nil vehicular congestion on the roads.^[6]

In the present study, the majority of cases taken up for study were 80% males followed by 20% females [Table 3] which were similar with most of the studies conducted previously

including the ones by Kamdar et al (1974),^[7] Singh et al (2005),^[8] Jha et al (2004),^[9] Sharma et al(2011),^[10] Menon et al (2008),^[11] and Mitra et al(2018).^[12] The probable reason for male dominance in the cases studied can be the male drivers were more as compared to the females, more likely to work outside thus are more prone to road traffic injuries.

In the present study, majority of cases belong to the age group of 21 -30 years (34.72%) followed by 30.2 % in the age group of 31 to 40 years [Table 3]. Similar findings were observed by the study of Chaudhary et al (2005) which shows maximum incidence in the age group of 20-29 years followed by 30 to 39 years having 27.20% cases.^[13] The finding of the present study coincides with study conducted by Rautji et al (2006),^[14] Kumar et al (2008),^[15] Shinde et al(2012),^[16] Singh et al (2005),^[8] Jha et al (2004),^[9] Sharma et al (2011),^[10] Patel et al (2005),^[17] Tandle et al (2011),^[18] Honnuagar et al (2011),^[19] Mitra et al (2018),^[12] Menon et al

(2008),^[11] Montazeri et al (2004),^[20] and Surrender(2013).^[21] Dhatarwal et al (2004),^[22] also had similar findings regarding the commonest age group involved was 21-30 years (27.3%) followed by 31-40 years (20.6%). The results of study by Soroosh et al (2020),^[23] also showed that the young age group of 21-40 years had the highest rate of traumatic injuries. Similar finding was observed in study by Gopal et al (2021),^[24] were observed in the 21-30 years age group weighing 30.06% cases. This finding also correlates with study conducted by, Chandra Hasini et al (2019),^[25] and Salgado et al (1988).^[26] However, it did not correlate with a similar study conducted by Manoj et al (2019).^[27] Plausible explanations may be attributed to the regional difference and vehicular preferences. In another study by N. Ranganathan (1991),^[28] also reported that people of the 3rd decade of age were most commonly involved in road traffic injuries. The probable reason for high incidence in the young age group can be the more excitement, rash driving, and average driving speed. The extremes of ages remain indoors owing to the life age related conditions.

Among the marital status [Table 2] 56.33% cases were married. among the religion background. The most of the population in the Punjab is Sikh religion thus the Sikh population in the study was predominant contributing 66.53% of cases followed by Hindu (15.1%). The unknown cases were 7.35%. This result depend on the area of study as the religion majority differs from place to place. As in the study by Varun et al (2020),^[29] majority of victims were Hindu (93.1%) followed by Muslim in 5.9% cases. Others studies like that of Banzal et al (2015),^[30] and

Verma et al (2015),^[31] that also reported Hindu predominance as the area in which the study was conducted have majority Hindu population.

In present study, the majority of cases (70.61%) that met with road traffic injury happened at evening time period followed by morning and afternoon period that had 22.86% cases while on 6.53% cases occurred at night time [Table 4]. Similar finding was observed in study by Varun et al (2020),^[29] where 66.7% deaths due to RTI happened in evening time period. The finding was similar with findings of studies conducted by Janani et al (2020),^[32] that most no of deaths were observed in evening time period followed by morning time period and Husain et al (2020),^[33] where maximum deaths occurred in 12 noon to 6pm similar results were seen in the study conducted by Kyada et al (2012),^[34] Aggarwal et al (2012),^[35] and Jha et al (2004),^[36] which observed maximum deaths during evening period in road traffic injuries. The present study differs from the finding in the study conducted by Singh et al (2005).^[8] Pathak et al (2009),^[36] Lalwani et al (2009) and Shruthi at al (2013) which observed maximum number of death in morning time period of 6 am to 12 noon.^[37,38] The probable reason can be the peak hours of going to work and going back to home are morning and evening respectively contributing to increase in traffic congestion on the roads.

In the present study, according to the mode of transport two wheelers (49.39%) were the most commonly involved in road traffic injuries followed by pedestrian (28.98%) and 7.76% each of two-wheeler non motor and four-wheeler motor [Table 5] which was in accordance with finding of the study

conducted by Janani et al (2020),^[32] where 70% of victims were in two-wheeler followed by 24% pedestrians and Varun et al (2020),^[29] where 61.8% cases were two wheelers followed by 24.5% cases of pedestrians. The two wheelers are efficient in congestion as well as fuel efficient thus leading to increase in purchase of two wheelers by all the age groups especially young individuals who are engaged in unlawful racing activities contributing to increase in road traffic injuries and mortalities. The finding was different from the study conducted by Husain et al (2020),^[33] Dhatarwal et al (2004),^[22] and Wasnik et al (2012),^[39] where the offending vehicle was four-wheeler in 56% cases followed by two-wheeler in 27.5% cases.

In the present study, the distribution of cases according to time between injury and death [Table 6], most of the cases died within 6 hours contributing 45.71% followed by death at the spot in 34.69% cases. It was followed by 6 to 12 hours in 9.8% cases. Only 0.41% cases were present in time period of more than 7 days between injury and death. The finding was similar with Husain et al (2020),^[33] where time of incidence was on the spot death and within 6 hours in 40.50% cases. In another study by Sharma et al (2005),^[40] where 50.47% cases died within 6 hours of the accident and Janani et al (2020),^[32] where 50% cases were brought dead. Other studies showing similar results were Arif et al (2015),^[41] and Kalougivaki et al (2014).^[42] The probable reason was the accidental injuries are too severe to seek treatment thus most of them died on the spot or within few hours of the incident.

Head injury was the cause of death in 42.45% cases followed by 33.88% cases having

multiple injuries/polytrauma. 20% cases had injuries on chest and abdomen while 2.86% had neck injuries [Table 7]. Similar finding was seen in study by Janani et al (2020),^[32] where 59% cases died due head injury. Head injury is one of the commonest cause of death as reported in studies by Singh et al (2005),^[8] Shruthi et al (2013),^[38] and Arif et al (2015).^[41] In another study by Husain et al (2020),^[33] where 56% of victims died as result of head injury, Rautji et al (2006),^[14] that had 43.5% deaths due to head injury, and Kaul et al (2005) where 29.15 cases of head injury.^[43] The present study is in accordance with the study by Dhatarwal et al (2004),^[22] Chaudhary et al (2005),^[13] Wasnik et al (2012),^[39] and Mishra et al (2010).^[44]

CONCLUSIONS

The Road Traffic injuries are occurring due to reckless and speedy driving, irresponsible behaviour of driver towards the traffic rules and overburdened public transport. Most of the road traffic injuries deaths are preventable. A wide range of scientific system approach and effective road safety interventions to road safety are essential to tackle the problem. Motorization though has enhanced the lives in this era but that has come up with some price. High priority is demanded towards the alarming rate of human loss due to RTIs. Awareness at every level including the strict implementation of the policies, individual awareness and strategies that would prevent such RTIs in future. There should be zero tolerance against the disobedience of the traffic rules like reckless driving, overspeed, driving under the effect of any intoxicants and driving without helmet.



REFERENCES

1. Lozano R, Naghavi M, Foreman K, Lim S, Shibuya K, Aboyans V, et al. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet*. 2012 Dec 15;380(9859):2095-128.
2. GBD 2016 Causes of Death Collaborators. Global, regional, and national age-sex specific mortality for 264 causes of death, 1980-2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet*. 2017;390(10100):1151-1210. doi: 10.1016/S0140-6736(17)32152-9.
3. Gopalakrishnan S. A public health perspective of road traffic accidents. *J Family Med Prim Care*. 2012;1(2):144-150. doi:10.4103/2249-4863.104987
4. Borowy I. Road traffic injuries: social change and development. *Med Hist*. 2013;57(1):108-138. doi:10.1017/mdh.2012.83
5. Prasad BK, Prasad C. Road traffic accident (RTA) as major killer: a report on medico-legal autopsies in Bharatpur hospital. *Kathmandu Univ Med J (KUMJ)*. 2003;1(1):34-5.
6. Soni P. Effects of COVID-19 lockdown phases in India: an atmospheric perspective. *Environ Dev Sustain*. 2021;23(8):12044-12055. doi:10.1007/s10668-020-01156-4
7. Hausmann K, Skrandies G. Aplastic anaemia following chloramphenicol therapy in Hamburg and surrounding districts. *Postgrad Med J*. 1974;50 Suppl 5(581):131-136.
8. 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.
9. 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).
10. Sharma D, Singh U, Mukherjee S. A study on road traffic accidents in Anand-Gujarat. *Healthline*. 2011;2(2):1-5.
11. Menon A, Pai VK, Rajeev A. Pattern of fatal head injuries due to vehicular accidents in Mangalore. *J Forensic Leg Med*. 2008;15(2):75-7. doi: 10.1016/j.jflm.2007.06.001.
12. Mitra S, Sarkar AP, Saren AB, Haldar D, Saha I, Sarkar GN. Road traffic injuries: A study on severity and outcome among inpatients of a tertiary care level hospital of West Bengal, India. *J Emerg Trauma Shock*. 2018; 11(4):247-52.
13. Chaudhary B, Singh D, Tirdude 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.
14. 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):157-65. doi: 10.1258/rsmmsl.46.2.157.
15. Lalwani S, Kumar A, 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.
16. 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.
17. Patel DJ, Agnihotram G. Study of Road Traffic Accidental Deaths (RTA) in and Around Bastar Region of Chhattisgarh. *J Indian Acad Forensic Med*. 2005;32(2):110-2.
18. 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).
19. 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):1-4.
20. Montazeri A. Road-traffic-related mortality in Iran: A descriptive study. *Public Health*. 2004; 118(2):110-3.
21. Surender J. Pattern of injuries in fatal road traffic accidents in Warangal area. *J Indian Acad Forensic Med*. 2013;35(1):57-9.
22. Singh H, Dhatarwal 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.
23. Soroosh D, Nematshahi M, Javadinia SA, Hesamifard M. Study of the Pattern and Frequency of Road Traffic Injuries in Car Occupants in the



- Eastern Part of Iran. *Int J Med Toxicol Forensic Med.* 2020;10(2):28112.
24. Gopal B K, Jagannatha S R, Viswakanth. B, Harsha R G. Analysis of cranio-cerebral injuries in vehicular accident victims in south Bangalore: A two-year retrospective study. *Indian J Forensic Community Med.* 2021;8(3):143-146.
25. Hasini BRC. Death Due to Road Traffic Accidents: A Forensic Study. *Indian J Forensic Med Pathol.* 2019;12(2):67-71.
26. Salgado MSL, Colombage SM. Analysis of Fatalities in road accidents in Colombo. *Forensic Sci Int.* 1988;36(1-2):91-6.
27. Manoj G, Ruia SM, Viswakanth B. Analysis of Cranio-Cerebral Injuries in Fatal Road Traffic Accidents: A Prospective Autopsy Study. *Indian J Forensic Med Toxicol.* 2019;13(2):181-3.
28. Kalantari M, Zanganeh Shahraki S, Yaghmaei B, Ghezelbash S, Ladaga G, Salvati L. Unraveling Urban Form and Collision Risk: The Spatial Distribution of Traffic Accidents in Zanjan, Iran. *Int J Environ Res Public Health.* 2021;18(9):4498. doi:10.3390/ijerph18094498
29. Varun A, Mishra PK, Tomar JS, Jain N. Socio-demographic profile of head injury victims in road traffic accidents, an autopsy based study at SAMC & PGI, Indore. *Indian J Forensic Community Med.* 2020;7(2):56-60.
30. Banzal RK, Jaiin A, Yadav J, Dubey BP. Pattern and Distribution of Head Injuries in Fatal Road Traffic Accidents in Bhopal Region of Central India. *Indian Acad Forensic Med.* 2015;37(3):242-5.
31. Verma P, Gupta SC, Singh G. An epidemiological study of road traffic accident cases admitted in a tertiary care centre of Uttar Pradesh. *Public Health Rev. Int J Public health Res.* 2015;2(4):74-9.
32. Janani S, Julius R, Balasubramanian S. Road traffic mortality in North Chennai - An autopsy based study. *Indian J Forensic Community Med.* 2020;7(1):4-6.
33. Husain BN, Dixit PG, Biyabani SN. Demographic profiles of victims of fatal road traffic accidents in central Indian population: A cross sectional study. *Indian J Forensic Community Med.* 2020;7(1):33- 7.
34. Kyada H, Mangal H, Momin S, Vijapura M, Bhuvra S. Profile of Fatal Road Traffic Accidents in Rajkot City. *J Indian Acad Forensic Med.* 2012;34(2):135-8.
35. Aggarwal A, Kaur S. Sociodemographic Profile of Road Traffic Accident Victims admitted at Emergency Surgical OPD of a Tertiary Care Hospital. *J Postgrad Med, Educ Res.* 2012;46(1):15-8.
36. 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.
37. Arvind K, Lalwani S, Agrawal D, Ravi R, Dogra TD. Fatal road traffic accidents and their relationship with head injuries: An epidemiological survey of five years. *Indian J Neurotrauma.* 2008;5:63-7.
38. Shruthi P, Venkatesh VT, Viswakanth B, Ramesh C, Sujatha PL, Dominic IR. Analysis of fatal road traffic accidents in a metropolitan city of South India. *Indian Acad Forensic Med.* 2013;35(4):317-20.
39. Wasnik R. Analysis of fatal road traffic accidents in Nagpur (Maharashtra). *Med Leg Update.* 2012;12(1):68-9.
40. Sharma BR, Gupta M, Bangar S. NISS a valuable tool for trauma scoring on autopsy. *Pak J Biol Sci.* 2005;8(7):995- 1000.
41. Arif M, Ahmed M, Rasool SH. Road traffic accidents; autopsy based study in Multan. *Professional Med J.* 2015;22(5):621-6. 1
42. Kalougivaki JJVP, Goundar RPS. Retrospective autopsy based study of fatal road traffic accidents in Fiji. *J Forensic Res.* 2014;5:243.
43. 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).
44. Mishra B, Sinha Mishra ND, Sukhla S, Sinha A. Epidemiological study of road traffic accident cases from Western Nepal. *Indian J Community Med.* 2010;35(1):115-21. doi: 10.4103/0970-0218.62568.

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