

Content available at: <https://www.ipinnovative.com/open-access-journals>

Indian Journal of Forensic and Community Medicine

Journal homepage: <https://www.ijfcm.org/>

Original Research Article

Analysis of cranio-cerebral injuries in vehicular accident victims in south Bangalore: A two-year retrospective study

Gopal B K^{1,*}, Jagannatha S R¹, Viswakanth. B², Harsha R G¹¹Dept. of Forensic Medicine, Kempegowda Institute of Medical Sciences, Bangalore, Karnataka, India²Dept. of Forensic Medicine, Kanachur Institute of Medical Sciences, Mangalore, Karnataka, India

ARTICLE INFO

Article history:

Received 06-08-2021

Accepted 02-09-2021

Available online 18-09-2021

Keywords:

Road Traffic accidents

Death

Head Injury

Cranio-cerebral

Fracture

Autopsy

ABSTRACT

Introduction: Road traffic accidents are regarded as the most common non communicable epidemics of the world. They are also a major cause for morbidity and mortality. The most common and vulnerable part of the body which is affected during road accidents is the head. This study was done at KIMS hospital Bangalore with an aim to observe the range of cranio-cerebral injuries by analysing the postmortem records between January 2011 to December 2012 retrospectively, which would provide valuable data for implementing effective emergency services to reduce trauma related mortality.

Materials and Methods: During the 2-year study period the study population had a total of 143 decedents ranging between age 5 years to 84 years. Victims of both sexes comprised the study population. The spectrum of head injuries with respect to incidence of skull fractures and type of intracranial haemorrhage were noted.

Results: Male predominance was seen over females in 83% of cases. The most common age group to be affected was between 21-30 years, who made 30% of study population. 52% of the decedents had skull fractures, of which 50% of them had sub-arachnoid haemorrhage followed by 47% of decedents with sub-dural hemorrhage. Pedestrians accounted to 38% of the decedents while the remainder 62% accounted for vehicular occupants.

This is an Open Access (OA) journal, and articles are distributed under the terms of the [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License](https://creativecommons.org/licenses/by-nc-sa/4.0/), which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprint@ipinnovative.com

1. Introduction

Road traffic accidents are regarded as the most common non communicable epidemics of the world. They are also a major cause for morbidity and mortality.¹ The increasing population, rapid urbanization, industrialization and migration along with other social changes have resulted in increasing necessity for travel across all age groups in the entire country.² Road traffic accidents are a leading cause of death in all age groups in developed and developing countries. They account for 2.1% of global mortality. India accounts for about 10% of road accident fatalities worldwide.³ Sondel PD in 1983 expressed his view on

vehicular accidents in the 'World Health Forum' as follows; "It took from 1900 to 1952, half a century for drivers in United States of America to cause killing a million human beings. But by 1975, only 23 years later, they had killed a second million and by 1991 in just another 16 years they will; at current rate, have killed a third million".⁴ The most vulnerable part of the body which is affected in road traffic accidents is the head. Head injury is defined as a morbid state resulting from the gross or subtle changes in the scalp and/ or the contents of the skull, produced by mechanical forces.^{5,6} Injuries due to RTA depend upon a number of factors-human, vehicle and environmental factors play vital roles before, during and after a fatal vehicular accident. To name a few, human errors, driver fatigue, poor

* Corresponding author.

E-mail address: drbkgopal2020@gmail.com (Gopal B K).

traffic sense, mechanical fault of vehicle, speeding and overtaking, violation of traffic rules, poor road conditions, traffic congestion, road encroachment make a list. Since the causes of R.T.A. are diverse in nature, damage caused may vary from trivial injury to gross bodily damage leading to death. Bangalore city traffic police accident statistics reports a total of 755 deaths and 4475 people injured in the year 2012. A population survey covering 20,000 households and 96,000 individuals from urban and rural Bangalore reported an annual RTA mortality rate of 240/million population, much higher than the figures reported by police statistics.⁷

This human loss at such an alarming rate deserves highest priority, hence a two-year retrospective study was undertaken at KIMS hospital Bangalore and an attempt is made here, to study the pattern of cranio-cerebral injuries in the decedents and to make some constructive suggestions which may contribute scientifically to reduce morbidity and mortality. The observations thus made are represented in this paper by us.

2. Materials and Methods

The study material consisted of 1069 medicolegal autopsies conducted in the department of forensic medicine and toxicology, Kempegowda Institute of Medical Sciences, Bangalore, Karnataka between January 2011 to December 2012 making it a period of two years. Of these, 143 cases (13.37%) were deaths due to cranio-cerebral injury sustained during road traffic accidents, which were studied retrospectively after obtaining clearance from the institutional ethical clearance committee.

Criteria for selection of cases

1. All cases of head injuries which have a definite history of road traffic trauma were taken for the study.
2. Cases where cause of death was opined as multiple injuries sustained in road traffic accidents were excluded
3. Cases in which bleeding in brain was ruled to be due to some disease process and not due to trauma were excluded.

2.1. Material

1. Road traffic accident head injury decedents subjected to medico legal autopsy.
2. Documents received from investigating officers, postmortem examination reports.
3. Cases summary in cases which were admitted in some hospital before death.
4. Autopsy table and instruments.

A detailed proforma for recording the particulars such as history, age, sex and injury spectrum was prepared. The information thus collected, was analyzed using appropriate statistical tools (namely Microsoft Excel and IBM SPSS).

3. Results

During this study period, 1069 cases were brought for post-mortem examination out of which 143 (13.37%) deaths were due to road traffic accidents. The highest number of victims 43 (30.06%) belonged to age group of 21-30 years. (Table 1) Males dominated females in number of deaths by far i.e. 119 victims were males (83.2%) and 24 victims were females (16.78%). (Table 2) Among the victims 38.46% were pedestrians and 61.5% of the victims were vehicular occupants. When the spectrum of cranio-cerebral injuries was studied we noted that 52.4% of the victims had skull fractures. Sub-arachnoid haemorrhage was the most common intracranial hemorrhage and it was present in 50.4% of the victims. The second most common intracranial hemorrhage was sub-dural hemorrhage and was observed in 47.4%. Extradural & Intracerebral hemorrhage was observed in 1.4% (each) of the cases. (Table 3)

Table 1: Age distribution of decedents

| S. No. | Age Group (years) | No. of deaths | Percentage (%) |
|--------|-------------------|---------------|----------------|
| 1. | 1-10 | 1 | 0.7 |
| 2. | 11-20 | 8 | 5.6 |
| 3. | 21-30 | 43 | 30.06 |
| 4. | 31-40 | 9 | 6.3 |
| 5. | 41-50 | 28 | 19.6 |
| 6. | 51-60 | 23 | 16.01 |
| 7. | 61-70 | 19 | 13.28 |
| 8. | 71-80 | 8 | 5.6 |
| 9. | 81-90 | 4 | 2.8 |

Table 2: Sex distribution of decedents

| Sex | Number of decedents | Percentage (%) |
|--------|---------------------|----------------|
| Male | 119 | 83.2 |
| Female | 24 | 16.78 |

Table 3: Spectrum of cranio-cerebral injuries

| S. No. | Feature | Number of decedents | Percentage (%) |
|--------|--------------------------|---------------------|----------------|
| 1. | Skull Fracture | 75 | 52.4 |
| 2. | Extradural Hemorrhage | 2 | 1.4 |
| 3. | Sub-dural Hemorrhage | 67 | 47.4 |
| 4. | Sub-arachnoid Hemorrhage | 71 | 50.4 |
| 5. | Intracerebral hemorrhage | 2 | 1.4 |

4. Discussion

India seems to be rising every morning with news of some major road traffic accident and one can therefore reasonably

perceive that occurrence of road traffic accidents have acquired the dimension of a man made epidemic. It is said that every 4 minutes or so a person is killed or injured in India due to a vehicular accident. In this section we compare our findings with studies made by researchers prior to our study period to arrive at an appropriate conclusion.

In the present study, we observed that highest number of road traffic accident victims who died due to cranio-cerebral injuries were males weighing an overwhelming percentage of 83.2% and this finding has been consistent with several researchers prior to our study and to cite a few, Wynder et al. in 1981⁸ and Weldon LB in 1986,⁹ Lalwani S et al. in 2008¹⁰ and Malik et al. in 2010.¹¹

With respect to the age distribution, majority of the victims were observed in the 21-30 years age group weighing a percentage of 30.06%. This finding correlates with those made by Lalwani S et al, Chandra Hasini,¹² Waller J¹³ and Salgado M.¹⁴ However, it did not correlate with a similar study conducted by Manoj G et al.¹⁵ Plausible explanations to this discrepancy may be attributed to the regional difference and vehicular preferences by younger population during the mid-90's.

Attention towards pedestrians or occupants of a vehicle, our study revealed that majority of the victims were vehicular occupants and accounted for 61.5% of deaths. This finding has been consistent with similar observation made by Pal R et al.¹⁶ However it has not been consistent with findings made by most researchers prior to our study, to cite a few such as Malik et al, Manoj G et al and Lalwani S et al.

Further, while analysing the incidence of presence of skull fractures, we observed that it was present in 52.4% of decedents. This finding has been in close consistence with observations made by Lalwani S et al, Manoj G et al, and Chandra Hasini. The variations in values may be attributed due to the difference in the duration of study period, as ours was capped at 2-years.

While dealing with the type of intracranial hemorrhage, we observed that 50.4% of decedents showed sub-arachnoid haemorrhage and 47.4% decedents showed subdural hemorrhage. This finding is consistent with the observation made by Manoj G et al, but did not correlate with many other prior researchers like Lalwani S et al, Chandra Hasini, and Malik et al. However, while comparing we noticed that the discrepancy was only within a small range of variance, as sub-dural hemorrhage was the most common finding in their studies, as was the scenario in our study too, where the margin between sub-arachnoid and subdural showed a minor difference of about 3%.

5. Conclusion

The usage of vehicles for transport has its profound merits undoubtedly, but also has its share of nuances. The famous Swiss physician, Paracelsus, who is regarded by many as the

pillar of Modern Pharmacology or as the pillar of Modern Toxicology by some, once quoted in the 15th century “The dose makes the poison”. The same can be attributed to this current situation in India or even globally for that matter with regard to deaths due to road traffic accidents. There have been several scholarly articles prior to ours where recommendations were published in an attempt to bring to notice of health care providers and policy makers to improve the road layout, strict policing so on and so forth. The authors of this article would like to take a different approach. Whilst taken in a right dose it acts as a medicine and the wrong dose becomes a poison, similarly if we stick to the ethics of life as law abiding citizens and use vehicles of transport responsibly (as occupants) or using the footpaths and crosswalks at the legally stipulated timing there could be a dramatic drop in deaths due road traffic accidents. We hope through this article that it would educate the readers that instead of subjecting the most vulnerable part of the human body, which being the head in road traffic accidents, (the same head) if put to proper use by all would prosper not only our lives but the entire nation.

6. Source of Funding

Nil

7. Ethical Committee Approval

Obtained

8. Conflict of Interest


Nil.

References

1. Park K. Epidemiology of Chronic Non-communicable Disease and Conditions. In: Park 's Textbook of Preventive and Social Medicine. Jabalpur, India: Banarsidas Bhanot Publishers; 2009. p. 353.
2. Peden M, Sminkey L. World Health Organization dedicates World Health Day to road safety. *Inj Prev.* 2004;10(2):67. doi:10.1136/ip.2004.005405..
3. Institute of Road Traffic Education, a nongovernmental organization based in New Delhi. New Delhi. Available from: <http://www.newsindia-times.com/2002/09/13/med30-poor.html>.
4. Sondel PD. Road Safety-putting people first. *World Health Forum.* 1983;4(2):167–8.
5. Dovom HZ, Shafahi Y, Dovom MZ, . . Fatal accident distribution by age, gender and head injury, and death probability at accident scene in Mashhad, Iran, 2006-2009. *Int J Inj Contr Saf Promot.* 2013;20(2):121–33. doi:10.1080/17457300.2012.692694.
6. Reddy K. The Essentials of Forensic Medicine and Toxicology. Editor MOP, editor. India: Jaypee brothers Medical Publishers; 2019. p. 199–226.
7. Prasad BK, Prasad C. Road traffic accident (R.T.A.) as major killer: a report on medicolegal autopsies in Bharatpur hospital. *Kathmandu Univ Med J (KUMJ).* 2003;1:34–5.
8. Wynder, Ernst L. Head Injuries. In: The Book of Health. London: Franklin Watts; 1981. p. 469–70.
9. Weldon LB. Police management of traffic accident prevention programs. 2nd ed. Institute of Polic Technology and Management; 1986. p. 89–94.

10. 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.
11. Malik Y, Chaliha R. Head Injury in Road Traffic Accidents - A Study from North East India. *Int J Contemp Med Res*. 2019;6(10):1-4.
12. and BRCH. Death Due to Road Traffic Accidents: A Forensic Study. *Indian J Forensic Med Pathol*. 2019;12(2):67-71.
13. Waller JA. Chronic medical conditions and traffic safety: Review of the California experience. *N Engl J Med*. 1965;273(26):1413-20.
14. Salgado MSL, Colombage SM. Analysis of Fatalities in road accidents in Colombo. *Forensic Sci Int*. 1988;36(1-2):91-6.
15. 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.
16. Ranabir P, Amrita G, Raman K, Sagar G, Swapan KP, Shrayan P. Public health crisis of road traffic accidents in India: Risk factor assessment and recommendations on prevention on the behalf of the Academy of Family Physicians of India. *J Family Med Prim Care*. 2019;8(3):775-83.

Author biography

Gopal B K, Associate Professor  <https://orcid.org/0000-0002-8866-0083>

Jagannatha S R, Professor

Viswakanth. B, Associate Professor

Harsha R G, Post Graduate

Cite this article: 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.