

A COMPARATIVE STUDY OF THE PATTERN OF INJURIES OCCURRING IN PATIENTS CAUSED DUE TO ROAD TRAFFIC ACCIDENTS IN CITY LIMITS AND HIGHWAY LIMITS

M. Raja¹, M. Natesan¹, N. Saleem Abdul Kuthus¹, B Sivakumar¹, K. Vinisha²

¹Assistant Professor, Department of General Surgery, Government Medical College Pudukottai, Tamilnadu, India

²MBBS Final Year, Department of General Surgery, Government Medical College Pudukottai, Tamilnadu, India

Received : 12/01/2023
Received in revised form : 11/02/2023
Accepted : 25/02/2023

Keywords:

A pilot study, road traffic accident, mortality, patient care, emergency medicine.

Corresponding Author:

Dr. B Sivakumar,
Email: sivasvbsb@yahoo.com

DOI: 10.47009/jamp.2023.5.4.229

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2023; 5 (4); 1136-1140



Abstract

Background: Road traffic accidents (RTA) are one of the major mortality concerns among patients worldwide. The injuries sustained in RTA can result in different outcomes based on factors such as event, type of vehicle, time of accident, nature of the injury or roads, etc. **Materials and Methods:** A 2-month pilot prospective study was conducted in the Surgery and Tamil Nadu Accident and Emergency Care initiative department. Patients directly admitted or referred to the centre from a duration of September 2021 to October 2021, were included in the study. Data was collected in the Accident Register book (AR book) including past medication history. Data collected were included in the Excel sheet for analysis. **Result:** A total of 60 patients were admitted under RTA cause out of which 83.33% were males and 16.66% were females from the age range between 7 to 85 years of age. A majority of the RTA were seen between the age group of 24-40 years of age. Motorcycle (68.33%), pedestrians (16.66%), car (8.33%), and bicycle (6.66%) accidents were most commonly reported. A total of 56.66% of vehicles were hit by another vehicle and self-fall was reported in 16.6% of RTA highways. City limits RTA caused by self-falls (43.33%), hit by vehicles (20.0%), and bad road conditions (16.66%). RTA at highways and city limits reported head and neck injuries (33.33% and 40.0%), followed by lower limb injuries (20.0% and 30.0%). **Conclusion:** RTA was most commonly found in cities with a huge need for better trauma care services and prehospital care.

INTRODUCTION

Road traffic accidents have emerged to be an important public health crisis. There is an increase in the number of road traffic accidents day by day which has led to an increase in pressure on the concerned agencies to prevent it and also to take emergency measures to save the priceless human life. It is seen that among the leading causes of death, road traffic injuries (RTI) ranked fourth.^[1]

Every year, approximately 1.35 million human lives are taken away in road traffic accidents. 20 to 50 million people suffer from non-fatal injuries, with many acquiring disabilities as a result of road traffic accidents. Deaths due to RTI are not only an economic loss for the family but also for the country's economy as well. Among these more than 90% of casualties due to road traffic accidents occur in emerging economic nations or developing countries.^[2]

India, coming under the category of “developing countries” of the world accounts for a terrifying number of road traffic accidents occurring every year to every second. In India road traffic accident cases decreased from 4,45,396 in 2018 to 4,37,396 in 2019. However, the death rate has increased by 1.3%.^[3] Tamil Nadu had a total of 57,228 road accidents that occurred in 2019 according to the Ministry of Road Transport and Highways (MoRTH), India.^[4] According to the data taken for the month of December 2020, Pudukkottai ranks 22nd in total number of accidents and 19th in total number of deaths for the same month. Pudukkottai is also one of the five districts in Tamil Nadu where fatalities and also the total number of accidents have to be decreased.^[5]

The most common reasons for road accidents are reckless driving, the rule of ‘Might make right’ of the bigger vehicles towards smaller vehicles, and above all the horrendous condition of the roads. There is a controversial statement that about 60% of vehicular

concentration is seen in the world's highly motorized countries but they account for only 14% of total road fatalities.^[6] Whereas, with only 16% of total vehicular possession, Asia accounts for 44% of total road fatalities.^[7]

In a study done by Misra et al, it was stated that factors such as age, gender, urban-rural distribution, type of vehicle, type of roads used, the time distribution of accidents, precautionary measures taken and cause of accidents have been consistently recorded in studies. Whereas, factors such as opposite colliding vehicle, sitting capacity of vehicles, site of accident, perception of the victims, psychological factors and prehospital care-related factors have been explored less, with only a handful of studies reporting these variables. This is one such study which is based on the site of the accident.^[9]

Two studies were based on the pattern of injuries in rural areas by Misra et al,^[9] and Shamim M.^[10] In a study by Singh et al, the Age and sex distribution of injured in road traffic accidents, circumstances leading to RTA, and Pattern and severity of injuries sustained in RTA cases were analysed.^[11]

The current study aims to compare the anatomical pattern of injuries among road traffic accident victims in city limits and highway limits, while also investigating and evaluating the socio-demographic profile of the patients. Analyzing the injury patterns in both cases will provide insights into the severity of organ damage, enabling the provision of immediate trauma care based on the geographical location of the accident.

MATERIALS AND METHODS

A 2-month pilot prospective study was undertaken at the Surgery ward and Tamil Nadu Accident and Emergency Care Initiative (TAEI) ward within the In-patient department, Department of Surgery, Government Pudukkottai Medical College and Hospital, Pudukkottai. This hospital is strategically located in close proximity to the National Highways and is well-equipped with an emergency department and ambulance services, making it a rapid emergency care provider for road traffic accident (RTA) victims in the surrounding areas.

The study involved 60 RTA victims who were either directly presented at the hospital or referred from primary and secondary healthcare centers between September 1, 2021, and October 30, 2021, forming the sample size for the investigation. Data for the study were collected from the patients' case sheets, and information about the accidents was obtained from the Accident Register book (AR Book). The AR Book contains details such as the patient's name, age, gender, date of the accident, location of the accident, and information pertaining to the injuries sustained by the patient.

Inclusion Criteria

- Patients who were admitted due to RTA

- Patients who were referred to TAEI for primary or secondary care after RTA
- Patients of all age groups were considered for this study

Exclusion Criteria

- Patients with a dubious history
- RTA victims due to collision with animals

Data analysis was done using Microsoft Excel 2010 and Microsoft Word 2010. Ethical Committee approval was obtained from Institutional Ethical Committee, Government Pudukkottai Medical College on 20th January 2020.

RESULTS

The study enrolled a cohort of 60 road traffic accident (RTA) victims between September 1, 2021, and October 30, 2021. Among the RTA patients, 50 (83.33%) were male, while 10 (16.66%) were female, resulting in a male-female ratio of 5:1. The age of the victims ranged from 7 to 85 years, and the age group of 24 to 40 years accounted for the highest number of accidents.

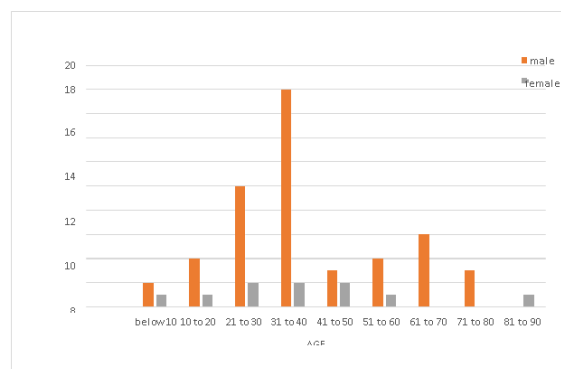


Figure 1: Age and gender distribution among RTA patients

[Table 1] presents a summary of the socio-demographic characteristics of the victims. Motorcycles were the most frequently involved vehicle type, accounting for 41 cases (68.33%), followed by pedestrians with 10 cases (16.66%), cars with 5 cases (8.33%), and bicycles with 4 cases (6.66%). The majority of accidents, 38 cases (63.33%), involved individuals in the driver's seat, while 12 cases (20%) involved pillion riders.

[Table 2] provides a comprehensive overview of the causes of accidents in both the Highway limit and City limit. In the Highway limit, the predominant cause of accidents was colliding with another vehicle, accounting for 56.66% of cases, followed by self-falls at 16.66%. On the other hand, in the City limit, the primary cause of accidents was self-fall incidents, representing 43.33% of cases, followed by collisions with other vehicles at 20%, and poor road conditions at 16.66%.

[Table 3] presents a comprehensive summary of the anatomical pattern of injuries observed in RTA victims with accidents occurring in the highway limit. The head and neck region were the most

commonly affected, accounting for a total of 10 injuries (33.33%), followed by lower limb injuries with 6 cases (20%), multiple injuries with 5 cases (16.66%), upper limb injuries with 4 cases (13.33%), thorax with 3 cases (10%), and abdomen with 2 cases (6.66%).

Regarding the type of injury, abrasions were the most frequent, accounting for 13 cases (43.33%), followed by lacerations with 8 cases (26.66%), contusions with 5 cases (16.66%), and fractures with 4 cases (13.33%).

Table 1: Socio-Demographic Profile of RTA Victims

Risk factors	Frequency	Per cent
Gender		
Male	50	83.33
Female	10	16.66
Age (In Each Decade)		
Below 10	3	5
10 TO 20	5	8.33
21 TO 30	12	20
31 TO 40	21	35
41 TO 50	5	8.33
51 TO 60	4	6.66
61 TO 70	6	10
71 TO 80	3	5
81 TO 90	1	1.66
Vehicle type		
Bicycle	4	6.66
Motorcycle	41	68.33
Car	5	8.33
Pedestrian	10	16.66
Victim position		
Driver	38	63.33
Pillion rider	12	20

Table 2: Cause of the Accident in City Limit and Highway Limit

Cause of the accident	Highways	City limit	Total (%)
Hit by another vehicle	17	6	23(38.33)
Self-fall	5	13	18(30)
Alcohol	3	2	5(8.33)
Bad road condition	2	5	7(11.66)
Reckless driving	3	4	7(11.66)
Total (%)	30(50)	30(50)	60(100)

Table 3: Pattern of Injury in RTA Victims of Highway Limit

Region of injury	Type of injury				Total (in %)
	Laceration	Abrasion	Fracture	Contusion	
Head and neck	2	5	1	2	10(33.33)
Lower limb	1	2	2	1	6(20)
Upper limb	2	2	0	0	4(13.33)
Thorax	0	0	1	2	3(10)
Abdomen	0	2	0	0	2(6.66)
Multiple	3	2	0	0	5(16.66)
Total (%)	8(26.66)	13(43.33)	4(13.33)	5(16.66)	30(100)

Table 4: Pattern of Injuries in RTA Victims of City Limit

REGION OF INJURY	TYPE OF INJURY				TOTAL (IN %)
	LACERATION	ABRASION	FRACTURE	CONTUSION	
HEAD AND NECK	8	1	2	1	12(40)
LOWER LIMB	3	0	4	2	9(30)
UPPER LIMB	0	2	0	0	2(6.66)
THORAX	0	0	0	1	1(3.33)
ABDOMEN	0	0	0	1	1(3.33)

[Table 4] provides a comprehensive overview of the pattern of injuries observed in RTA victims with accidents occurring in the city limit. Similar to the highway limit, the head and neck region were the most frequently affected, accounting for 12 injuries (40%), followed by lower limb injuries with 9 cases (30%), multiple injuries with 5 cases (16.66%), and upper limb injuries with 2 cases (6.66%). The thorax and abdomen regions had an equal prevalence of 1 case each (3.33%).

DISCUSSION

Road traffic accidents are a major health problem nowadays which is resulting in 85% of deaths and 90% of disability-adjusted life years lost.^[12] A total of 60 study subjects were included, out of which 30 patients were RTA victims of highway limits and 30 patients were RTA victims of city limits. The most common age group involved was 21 to 40 years of age (55%). The third (35%), second (20%) and sixth (10%) decades were most commonly affected in decreasing order. A similar result was achieved in other studies also.^[13-15] Males were most commonly involved in RTA (83.33%) and women were less (16.66%). This is similar to the previously done studies.^[16,17] The above results which show a difference between age and sex distribution are a mirror reflection of the nature of the job and income source of the family. Young males who are the sole earners of the family are most commonly affected. The type of vehicle most commonly involved in this study was a motorcycle (68.33%). The mode of transportation which is preferred by the people of an area most preferably depends on their occupation. Pudukkottai is a rural area and the main occupation of the people is agriculture, people prefer either motorcycles or use bullock carts or walk on the roads along with their livestock.

This is very clearly evident from [Table 1] where motorcycles followed by pedestrians (16.66%) are involved the most in RTA. In a similar study done in Karachi, had the same results of motorcycles being first and pedestrians being second.^[10] Motorcyclists were mostly males and pedestrians were mostly females. A similar finding arrived in an Austria-based study.^[18] This was followed by cars (8.33%) and bicycles (6.66%).

There is a wide range of differences between the geography of the highways and the city roads. All the previously conducted studies focused generally on the pattern of injuries in RTA victims. The type of vehicle, the speed with which they travel, traffic and many such factors differ between the highway and the city limit. In the highway limit head and neck were the most commonly involved region (33.33%), followed by lower extremities (20%), multiple injuries (16.66%), upper extremities (13.33%), thorax (10%), and abdomen (6.66%). Among the type of injuries, abrasions were more common (43.33%), followed by lacerations (26.66%),

confusion (16.66%), and fractures (13.33%). Abrasions in the head region had a greater prevalence (13.33%). It was very common in the parietal region which may be due to the non-use of protective gadgets such as helmets.

In the state limit, the distribution of injuries in different areas of the body showed a similar pattern as in highways. Head and neck injuries were the highest (40%), followed by lower extremities (30%), multiple injuries (16.66%), upper extremities (6.66%), and abdomen and thorax having the same ratio (3.33%). Yet there were differences in the type of injuries with laceration being high (43.33%), followed by fractures (23.33%), abrasions and contusions having an equal ratio (16.66%). This result was an unexpected one as the most severe type of injuries occurs at the highway limit than the city limit. But the severe forms such as lacerations and fractures were very common in the city limit. One probable reason for this may be due to the increased usage of vehicles leading to traffic jams in the city limit and overspeed of vehicles especially by the youth and bad condition of the roads in the city limit than in the highways. In a similar study done by Shamim M, it was reported as the lower extremities were more commonly involved followed by head and neck and multiple injuries.^[10] In a study done by Arun Prakash et al, the head and neck region, followed by the head and upper limbs were most commonly injured. And common injuries were abrasions and lacerations.^[19] In a study done by Verma et al, limbs followed by the head were mostly injured.^[20]

CONCLUSION

The high prevalence of Road Traffic Injuries (RTIs) within urban areas necessitates the establishment of an enhanced trauma care system, particularly focusing on prehospital interventions. Implementing road-safety awareness programs from an early age and persistently throughout college education can effectively instil the importance of adhering to traffic regulations, thereby mitigating this "Hidden Pandemic."

Combining improvements in pre-hospital care and definitive hospital-based treatments, along with comprehensive training for healthcare personnel, including ambulance drivers in basic first aid, holds the potential to reduce the incidence of RTIs. It is crucial to maintain comprehensive records of road traffic accidents, capturing all pertinent details related to each incident, in all healthcare facilities.

REFERENCES

1. Pate RS, Hire RC, Rojekar MV. The pattern of head injury in central India population. *Int J Res Med Sci* 2017; 5:3515-9.
2. Global status report on road safety 2018. WHO Available from: <http://www.who.int/news-room/fact-sheets/detail/road-traffic-injuries>
3. Accidental Deaths and Suicides in India 2019. Chapter-1 A. Road traffic accidents. Accessed on 24th July 2023. Available

- from: <https://ncrb.gov.in/sites/default/files/Chapter-1A-Traffic-Accidents 2019. Pdf>
4. Ministry of Road Transport and Highways. India. Road Accidents in India 2019. <https://morth.nic.in/road-accident-in-india>
 5. Road Accident Analysis in Tamil Nadu. Government of Tamil Nadu Home (Transport) Department. Available from: <http://tnsta.gov.in<pdf>>
 6. Bagaria V, Bagaria S. A geographic information system to study trauma epidemiology in India. *Journal of Trauma Management & Outcome*. 2007; 1:1–3. [PMC free article] [PubMed] [Google Scholar]
 7. Accidental deaths & suicides in India 2009. National Crime Records Bureau. Ministry of Home Affairs. Government of India. Retrieved from <http://ncrb.nic.in>. [Google Scholar]
 8. Farooqui JM, Chavan KD, Bangal RS, Syed MM, Thacker PJ, Alam S, Sahu S, Farooqui AA, Kalakoti P. Pattern of injury in fatal road traffic accidents in a rural area of western Maharashtra, India. *Australas Med J*. 2013 Sep 30;6(9):476-82. doi: 10.4066/AMJ.2013.1839. PMID: 24133540; PMCID: PMC3794418.
 9. Misra P, Majumdar A, Misra MC, Kant S, Gupta SK, Gupta A, Kumar S. Epidemiological Study of Patients of Road Traffic Injuries Attending Emergency Department of a Trauma Center in New Delhi. *Indian J Crit Care Med*. 2017 Oct;21(10):678-683. doi: 10.4103/ijccm.IJCCM_197_17. PMID: 29142380; PMCID: PMC5672674.
 10. Shamim M. Pattern of Injuries from Road Traffic Accidents Presented at a Rural Teaching Institution of Karachi. *Indian J Surg*. 2017 Aug;79(4):332-337. doi: 10.1007/s12262-017-1605-3. Epub 2017 Mar 1. PMID: 28827908; PMCID: PMC5549050. Motorcycle pedestrian. Head and neck1
 11. Singh R, Singh HK, Gupta SC, Kumar Y. Pattern, severity and circumstances of injuries sustained in road traffic accidents: a tertiary care hospital-based study. *Indian J Community Med*. 2014 Jan;39(1):30-4. doi: 10.4103/0970-0218.126353. PMID: 24696537; PMCID: PMC3968579.
 12. Nantulya VM, Reich MR. The neglected epidemic: road traffic injuries in developing countries. *BMJ*. 2002 May 11;324(7346):1139-41. doi: 10.1136/bmj.324.7346.1139. PMID: 12003888; PMCID: PMC1123095.
 13. Jha N, Srinivas DK, Roy G, Jagdish S. Epidemiological study of road traffic cases: A study from south India. *Indian Journal of Community Medicine*. 2004;29:20–4. [Google Scholar].
 14. Madubueze CC, Chukwu CO, Omoke NI, Oyakhilome OP, Ozo C. Road traffic injuries as seen in a Nigerian teaching hospital. *Int Orthop*. 2011 May;35(5):743-6. doi: 10.1007/s00264-010-1080-y. Epub 2010 Jul 11. PMID: 20623283; PMCID: PMC3080498.
 15. Hailemichael F, Suleiman M, Paulos W. Magnitude and outcomes of road traffic accidents at Hospitals in Wolaita Zone, SNNPR, Ethiopia. *BMC Res Notes*. 2015 Apr 9; 8:135. doi: 10.1186/s13104-015-1094-z. PMID: 25886357; PMCID: PMC4404595.
 16. Lapostolle A, Gadegbeku B, Ndiaye A, Amoros E, Chiron M, Spira A, Laumon B. The burden of road traffic accidents in a French Departement: the description of the injuries and recent changes. *BMC Public Health*. 2009 Oct 13; 9:386. doi: 10.1186/1471-2458-9-386. PMID: 19825170; PMCID: PMC2774692.
 17. Wong E, Leong MK, Anantharaman V, Raman L, Wee KP, Chao TC. Road traffic accident mortality in Singapore. *J Emerg Med*. 2002 Feb;22(2):139-46. doi: 10.1016/s0736-4679(01)00455-3. PMID: 11858917.
 18. Majdan M, Rusnak M, Rehorkikova V, Brazinova A, Leitgeb J, Mauritz W. Epidemiology and patterns of transport-related fatalities in Austria 1980-2012. *Traffic Inj Prev*. 2015;16(5):450-5. doi: 10.1080/15389588.2014.962133. Epub 2015 Jan 21. PMID: 25256803.
 19. Arun Prakash K.S.1 , Sanjeev K.2 , Gambhir Singh O.3. (2021). Prospective Studies on Pattern of Two-Wheeler Injuries in Road Traffic Accidents. *Medico Legal Update*, 21(1), 82– 86. <https://doi.org/10.37506/mlu.v21i1.2285>
 20. Verma PK, Tewari KN. Epidemiology of road traffic injuries in Delhi: Result of survey. *Regional Health Forum*. 2004;8(1):7–14. [Google Scholar]