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ORIGINAL ARTICLE

Profile of Road Traffic Accident Cases Autopsied at ACSR Government Medical College, Nellore, in 2022: A Retrospective Study

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Abstract

Road traffic accidents (RTAs) are a major cause of death and disability in low- and middle-income countries, contributing significantly to the global burden of disease. The primary causes of RTAs include over speeding, inappropriate driving, and poor road conditions in India. This study, conducted at a tertiary healthcare hospital in Nellore city, Andhra Pradesh, aimed to profile fatal RTAs, identifying the leading causes of death and factors contributing to accidents. The major cause of death in road traffic accidents in this study was head injury. Males aged 21 and above, along with pedestrians and two-wheeler riders, were the most affected groups. Preventing these fatalities requires a coordinated effort between civic authorities, police, and first responders to reduce pre-hospital deaths. Road safety awareness, along with improvements in infrastructure and traffic management, are essential to reducing the incidence and severity of these accidents in Nellore city.

Keywords: Road traffic accident, Traffic medicine, Cause of death, Autopsy, Mortality

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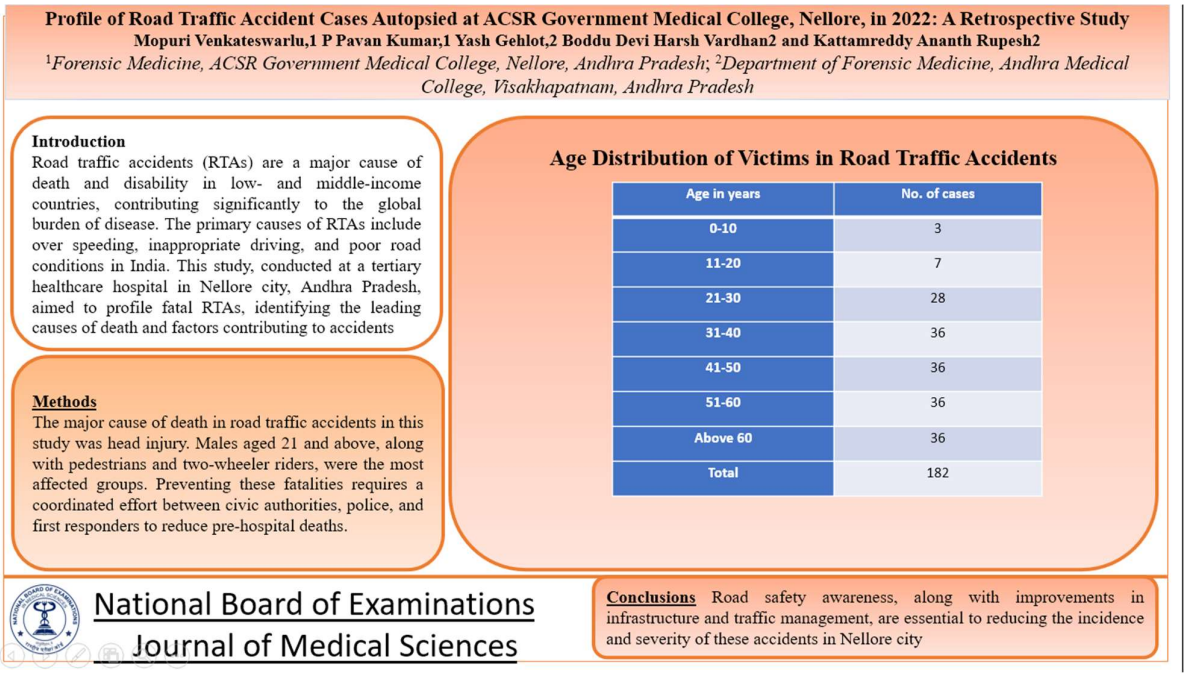
Graphical Abstract



Introduction

Road traffic accidents (RTAs) are among the leading causes of mortality and morbidity globally. They constitute a significant component of the global burden of disease and have garnered increasing attention within the field of public health [1]. RTAs result from a complex interplay of factors, which may be broadly categorized into human-related factors, vehicular factors, and external environmental variables. The important causal elements include speeding, driver error, influence of drugs/alcohol, distracted driving/mobile phone use, mechanical failure/ vehicular maintenance, suboptimal road conditions, poor visibility, adverse weather, failure of safety mechanisms such as airbags, and deficiencies in vehicle design to name a few.

Although the complete prevention of RTAs remains a formidable challenge due to the multifactorial nature of these events, mitigation of injury severity and reduction of fatalities represent achievable public health goals. This is principally relevant given that certain risk factors are modifiable and can be targeted through interventions. Comprehensive studies focusing on the determinants of RTAs and associated mortality are essential for designing interventions for prevention. A detailed analysis of the causes of death in RTAs provides significant insights into the effectiveness of current safety measures, including seat belts, helmets, and airbag deployment systems. Such research is vital to evaluate whether existing protective strategies are adequate or whether additional engineering/design modifications, legislative measures, or public health interventions are required to enhance occupant/pedestrian protection and reduce fatal outcomes in road traffic fatalities. Finally, with pedestrians being a major portion of RTA victims, a study on patterns of injuries and understanding the accident dynamics in pedestrians paves the way for designing walkways, elevated foot paths and planning urban infrastructure in a pedestrian-friendly manner [3].

Nellore city is the headquarters of Sri Potti Sriramulu Nellore district, located in the south coastal region of Andhra Pradesh. The present study aimed to analyze the profile of road traffic accident cases autopsied at the only tertiary health care facility in Nellore. The major objectives of the study were to assess the socio-demographic profile of the victims, evaluate the timing of accidents, identify the factors responsible for road traffic accidents, and examine the causes of death in different types of road traffic accidents [4]. This study complements the data available in the crime records and is a first step towards traffic medicine studies in the region. The study addresses the main research gap on understanding the factors like which type of injuries are causing major spot deaths, and the time during which accidents are more common in our region.

Methodology

This retrospective study included all road traffic accident cases autopsied at ACSR Government Medical College during the calendar year 2022. Data were collected from First Information Reports (FIRs), inquest reports, postmortem examination reports, toxicology reports i.e., chemical analysis of viscera reports, motor vehicle inspection reports and relevant medical records. RTA cases with incomplete data (final opinions pending or inaccessible files), along with all other cases, were excluded from the study. Descriptive statistical analysis of the data has been carried out by tabulating the variables in Microsoft Excel. A total of 182 RTA cases were included for analysis.

Results

The age distribution of victims of RTA is summarised in Table 1 with most victims being adults above the age of 21 years (172). Sex distribution of the victims is presented in Table 2 with males (142) being the large group of victims.

Table 1. Age Distribution of Victims in Road Traffic Accidents.

Age in years	No. of cases
0-10	3
11-20	7
21-30	28
31-40	36
41-50	36
51-60	36
Above 60	36
Total	182

Table 2. Sex Distribution of Victims in Road Traffic Accidents

Age Group	Gender		
	Female	Male	Total
0-10	3	0	3
11-20	1	6	7
21-30	1	27	28
31-40	5	31	36
41-50	6	30	36
51-60	9	27	36
61 Above	9	27	36
Total	**34**	**148**	**182**

The factors responsible for road traffic accidents in the victims are presented in Table 3. Over-speeding and driver negligence were identified as the major causative factors to the fatalities. While a few cases of hit and run were also noted [11].

Table 3. Factors Responsible for RTAs

Factor	Hospital death	Spot death	Total
Driver error (hit and run)	11	0	11
Drivers under the influence of alcohol	5	3	8
Overspeed	76	87	163
Total	92	90	182

The distribution of road traffic accidents across different times of the day shows that from 12 AM to 6 AM, there were 29 incidents, accounting for 15.93% of the total cases. Between 6 AM and 12 PM, 58 incidents occurred, making up 31.87% of the total. From 12 PM to 6 PM, there were 45 incidents, representing 24.73% of the total, while from 6 PM to 12 AM, 50 incidents were recorded, comprising 27.47% of the total.

The cause of death profile of the victims is tabulated in Table 4. The data shows that most fatalities were due to head injuries, with 65 deaths occurring at the hospital and 60 at the spot, totalling 125 cases.

Table 4. Cause of Death in RTA Victims

CAUSE OF DEATH			
	PLACE OF DEATH		
AGE GROUP	Hospital	Spot	Grand Total
0-10			
Head Injury	2	1	3
11-20			
Blunt Trauma to Abdomen	1	0	1
Head Injury	1	3	4
Multiple Injuries	1	1	2
21-30			
Blunt Trauma to Abdomen	1	0	1
Blunt Trauma to Chest	1	1	2
Head Injury	10	9	19
Multiple Injuries	1	2	3
Poly Trauma	2	1	3
31-40			
Blunt Trauma Chest and Abdomen	0	1	1
Blunt Trauma to Abdomen	1	1	2
Head Injury	14	10	24
Multiple Injuries	1	5	6
Poly Trauma	2	1	3
41-50			
Blunt Trauma to Abdomen	0	1	1
Crush Injury to Both Legs	1	1	2
Crush Injury to Leg	1	0	1
Head Injury	10	16	26
Multiple Injuries	5	0	5
Poly Trauma	0	1	1
51-60			
Blunt Trauma to Abdomen	0	2	2
Blunt Trauma to Chest	1	0	1
Crush Injury to Both Legs	1	0	1
Crush Injury to Leg	1	0	1
Head Injury	14	10	24
Multiple Injuries	2	3	5
Poly Trauma	1	1	2
61 Above			
Blunt Trauma to Abdomen	1	1	2
Head Injury	14	11	25

Multiple Injuries	2	2	4
Poly Trauma	2	3	5
Grand Total	**94**	**88**	**182**

The factors responsible for accidents in different vehicle types within the study population are summarized in Table 5, with two-wheeler accidents being the most common. The total number of victims in the study was 182 as mentioned earlier. The largest group of victims were two-wheeler users, with 88 riders and 20 pillion riders, totalling 108. This was followed by occupants of four-wheelers, including 14 rear occupants, 4 drivers, and 4 front-seat occupants, totalling 22. Pedestrians accounted for 52 victims.

Table 5. Vehicle Type and Factors Responsible for the RTA

AGE GROUP	FACTORS RESPONSIBLE FOR ACCIDENT			
TYPE OF VEHICLE	DRIVER ERROR (HIT AND RUN)	ALCOHOL INFLUENCE	OVER SPEED / DISTRACTED	GRAND TOTAL
0-10	0	0	3	3
2-Wheeler	0	0	3	3
11-20	1	1	5	7
2-Wheeler	0	1	5	6
4 Wheeler	1	0	0	1
21-30	2	1	25	28
2-Wheeler	0	1	20	21
3-Wheeler/Auto	0	0	1	1
4-Wheeler	2	0	2	4
Lorry	0	0	2	2
31-40	1	2	33	36
2-Wheeler	0	2	19	21
3-Wheeler /Auto	0	0	4	4
4-Wheeler	1	0	6	7
Bus	0	0	1	1
Lorry	0	0	2	2
Tractor	0	0	1	1
41-50		2	34	36
2-Wheeler	0	1	20	21
3-Wheeler Auto	0	0	1	1
4-Wheeler	0	0	8	8

Lorry	0	0	3	3
Mini Van	0	1	0	1
Tractor	0	0	1	1
Unknown Vehicle	0	0	1	1
51-60	3	2	31	36
2-Wheeler	1	2	14	17
3-Wheeler Auto	0	0	1	1
4-Wheeler	2	0	11	13
Lorry	0	0	3	3
Tractor	0	0	2	2
61 Above	4	0	32	36
2-Wheeler	2	0	16	18
3-Wheeler Auto	0	0	1	1
4-Wheeler	1	0	15	16
Unknown Vehicle	1	0	0	1
Total	11	8	163	182

Discussion

Road traffic accidents are a leading cause of unnatural deaths in developing countries, contributing significantly to injury-related disabilities and imposing a heavy socioeconomic burden. Despite these countries accounting for only 60% of the world's vehicles, they experience 93% of global road fatalities. The increasing number of road traffic deaths, driven by rapid urbanization and greater motorization, underscores the severity of this issue. Moreover, even in higher-income countries, individuals from lower socio-economic backgrounds are disproportionately affected by road traffic-related fatalities [5,6].

The present study reveals that males over 21 years of age are the most affected group in road traffic accidents, likely due to their active lifestyle, including commuting to work and other essential travel. Speeding is identified as the leading contributor to fatalities, with many deaths occurring at the scene of the accident. Head injuries are the primary cause of death, and two-wheeler riders are the most common victims, followed by pedestrians. Additionally, alcohol abuse is found to be a significant risk factor for road traffic accidents.

In a study by Sete et al. [7], the major cause of death was craniocerebral injury/head injury, with males being more frequently involved, is consistent with the findings of our study. But the higher number of spot deaths and pre-hospital care deaths in the present study indicate the fatal nature of the injuries and highlight the need for more timely medical attention. Global mortality of motorized 2–3 wheelers has increased by a relative ratio of 1.36 over a recent decade [8]. A similar trend of increased fatalities were noticed in terms of two-wheeler accidents in our study. Speeding, whether excessive or inappropriate, contributes to approximately 54% of global fatalities, with higher proportions observed in low- and middle-income countries (57%) compared to high-income countries (28%).

Our results show a similar trend, with over speeding identified as a major contributor to road traffic accidents [9].

The WHO has said that RTAs are the eight leading cause of death globally [10]. RTA autopsies constitute no less than a quarter of all unnatural deaths autopsied at our institute annually (the total annual autopsies conducted are around 800-1000). Although the present study indicates that 32% of road traffic accidents occurred between 6 AM and 12 PM, most accidents typically happen during the night hours, as seen in previous studies [11].

Interventions to prevent road traffic accidents (RTAs) include improving road safety infrastructure, enforcing stricter traffic laws, and promoting safe driving behaviours through public awareness campaigns. Additionally, measures such as implementing speed limits, enhancing vehicle safety features, and promoting the use of seat belts and helmets can significantly reduce fatalities. Targeted interventions in high-risk areas and for vulnerable road users, like pedestrians and motorcyclists, are crucial. Furthermore, effective emergency medical services and timely medical attention can help minimize the impact of injuries from RTAs [12].

In India, road safety has become a top priority, with the government adopting a comprehensive approach focused on education, engineering, enforcement, and emergency care. The new Motor Vehicles Act also imposes strict penalties for safety violations. Additionally, initiatives such as cashless treatment for accident victims and the installation of ambulances at toll plazas aim to reduce fatalities and improve response times [13].

A major limitation of the present study is the incomplete availability of data on the use of seat belts and helmets, which were therefore excluded from the analysis. However, these are important factors that could influence the outcomes of road traffic accidents.

Future studies of this sort are to be conducted annually in close collaboration with the district crime records bureau on all available datasets to identify key controllable variable in striving towards reducing the number of road traffic accident fatalities in Nellore region.

Conclusion

The present study on road traffic accidents in Nellore city during 2022 highlights that males aged 21 and above are most frequently involved, with two-wheeler riders and pedestrians being the primary victims. Over-speeding was identified as a key factor contributing to accidents. The high number of spot and pre-hospital deaths indicates the need for better coordination between civic authorities, the police, and hospitals for timely care. Promoting safety awareness, improving road infrastructure, and enhancing traffic management are essential to reducing fatalities and ensuring a safer city for all. Creating proper footpaths, walkways, and cycling tracks in Nellore city can encourage people to reduce their reliance on personal vehicles. Additionally, the lack of a robust public transport system and the excessive presence of three-wheeler autos contribute to the risk of road traffic accidents. Addressing these issues by improving infrastructure and promoting public transport would be key to reducing accidents and enhancing safety in the city.

Conflicts of interest

The authors declare that they do not have conflict of interest.

Ethics committee approval

The study has been approved by the Institutional Ethics Committee of ACSR Government Medical College, as per reference number 083/SRC/2024, dated 06/01/2025.

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