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Original Research Article

Epidemiological profile of reported road traffic accident cases to emergency medicine department of a teaching medical college in South Karnataka

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ABSTRACT

Background: The study delves into the pressing issue of Road Traffic Accidents, a significant public health concern worldwide, particularly in low- and middle-income nations. With the backdrop of the 2030 Agenda for Sustainable Development, road safety has gained paramount importance. This research aims to comprehensively examine the multitude of factors influencing RTAs by analyzing data sourced from individual interviews, case summaries, and medico-legal records from a tertiary care hospital's Emergency Medicine Department.
Methods: A hospital-based cross-sectional study conducted at JSS hospital, Mysuru. Data from 1525 retrospective cases spanning (2019-2021) and 114 prospective cases from December 2022 to January 2023 were analyzed. A pre-tested, semi-structured proforma gathered socio-demographic variables, etc. Analysis revealed a surge in accidents in 2021 compared to previous years, with a majority occurring between 8 pm to 8 am. Primarily in the 21-30 years age group. Over the three-year period, 72 fatalities were recorded, predominantly among males.
Results: The study identified significant associations between RTAs and factors such as gender, vehicle type, mode of transportation, and referring hospital. Lower education levels correlated with increased risk, highlighting the importance of road safety education. Additionally, a striking urban-rural disparity was noted, with majority of RTAs occurring in rural areas.
Conclusions: Overall, this study underscores the complex nature of RTAs and highlights the importance of addressing multiple risk factors to effectively mitigate road traffic injuries. By understanding these factors, policymakers and healthcare professionals can develop targeted interventions aimed at reducing the burden of RTAs and promoting safer road practices.

Keywords: Accidents, Traffic, Epidemiological factors, Tertiary care hospital, South Karnataka

INTRODUCTION

A Road Traffic Accident (RTA) is defined as an incident occurring on a public road resulting in injury or death, involving at least one moving vehicle, or collisions with pedestrians, animals, or environmental obstacles. Road safety was explicitly incorporated into the 2030 Agenda for Sustainable Development, specifically in Targets 3 and 11, concerning health and urban development. Shockingly, the World Health Organization reports that approximately 1.3 million individuals lose their lives annually due to road traffic accidents, underscoring the critical need for enhanced safety measures and interventions on the roads.[1] Road Traffic Accidents

(RTAs) present a significant global public health challenge, particularly affecting developing nations like India. This issue is exacerbated by factors such as globalization, rapid urbanization, industrialization, economic growth, modern lifestyles, and increased reliance on motorized transportation. RTAs have now emerged as a leading cause of mortality, morbidity, and disability, imposing a substantial socio-economic burden on societies, not only in India but worldwide.[2] They are currently recognized as a critical public health concern and are expected to worsen in the coming years due to a substantial increase in the number of automobile users. RTAs are intricate occurrences shaped by numerous factors. These encompass non-compliance with speed limits, distractions while driving, the omission of safety precautions like helmets and seat belts, shared road usage by pedestrians and animals, inadequate separation of vehicular and pedestrian traffic, the prevalence of aging and poorly maintained vehicles, including motorcycles and scooters, substandard driving practices, crowded buses, and widespread violations of traffic regulations.[3] The elevated incidence of road traffic injuries (RTIs) in developing nations is a consequence of several contributing factors, encompassing the proliferation of motor vehicles, deficient enforcement of traffic safety regulations, inadequate healthcare infrastructure, and subpar transportation networks. Research underscores that road safety concerns are multifaceted, each necessitating individualized attention. Consequently, the investigation of road traffic accidents (RTAs) calls for an epidemiological approach, which takes into account agent, host, and environmental factors, along with the spatiotemporal distribution involving time, location, and individuals.[4] Mysore, classified as a Two-Tier city, is witnessing a substantial population increase and a surge in vehicular traffic, including mixed traffic areas. In light of reported RTA numbers by authorities and the media, this study aimed to know the profile, associated factors, and the health risk impact on individuals attending EMD, JSS Hospital, Mysuru, given its significant population reach in terms of patient load similar to Government Hospital, Mysuru.

METHODS

In this hospital-based study, data for retrospective study spanning three years (January 2019-December 2021) was collected from Medico legal case (MLC) register maintained in Medical Records Department, JSS Hospital, Mysuru and data for prospective study (December 2022 to January 2023) was captured from cases reported and registered as MLC in Emergency Medicine Department, JSS Hospital. A structured RTA survey form, pretested for accuracy, was used to collect information through interviews for prospective study. Inclusion criteria - RTA injured patients of any age who report/brought to EMD, JSS Hospital Mysuru, were screened and their informed consent was obtained, outlining the study's purpose, procedures, risks, benefits, confidentiality, and participant rights. In cases where patients were unfit for interview, insights were sought from their relatives or close contacts. Written informed consent was procured from patients or their companions before data collection. Prior to the interview, a concise overview of the study was provided. The data collected through interviews encompassed socio-demographic information, precise details of the RTA incident (time, date, location), vehicle types, collision methods, injuries sustained, substance use history, safety measures employed (like helmets, seat belts), vital signs, and outcomes. Exclusion criteria - All other patients reporting with history of any fall or other medical/surgical emergencies, were excluded from the study.

Statistical analysis

Data was first entered into MS Excel 2010 and later analyzed with IBM SPSS version 25 software. For qualitative data, percentages were used, while quantitative data were expressed as means and standard deviation, $p<0.05$ was considered to indicate statistical significance.

RESULTS

Details of 1525 retrospective RTA cases collected from MLC register of complete three-year period from January to December in 2019, 2020, and 2021, reveals a surge in accidents during 2021 compared to the preceding years. Specifically, 2021 recorded 639 RTAs, constituting 42.0% of the total, while 2019 and 2020 showed nearly equivalent accident numbers with 446 (29.2%) and 440 (28.8%) cases, respectively (Figure 1). Regarding the timing of accident reporting across these three years, the majority of RTA cases, accounting for 680 (44.6%), were reported to the hospital between 8 pm and 8 am hours.

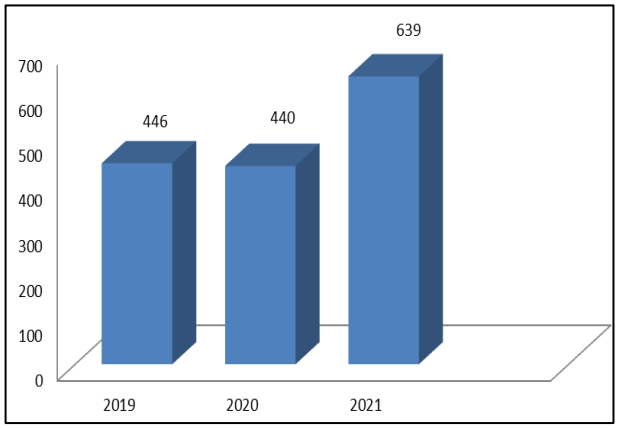

Figure 1: Year-wise distribution of RTA cases (2019-2021) (n=1525).

Socio-demographic profile of victims

A total of 1639 road traffic accident cases were reported to Emergency Medicine Department at JSS Hospital Mysuru (retrospective =1525 records based and

prospective =114 cases) during the study period. All these cases were included in the study. Majority, 75.41% of the victims were in the age group of 11-50 years. Victims less than 11 years were grouped under the category of children. 81.45% of the victims were males. Of the prospective 114 victims interviewed, 60.51% of the victims had a primary level of education while 12.3% of the victims were illiterates. Out of total, 63.15% of the victims were unskilled labourers like manual labourers and farmers etc., while 23.68% of the victims were students. Among 1639, the female victims accounting for 18.54% of the injuries.

Table 1: Distribution of subjects according to site, severity of injury and type of road user (n=1639).

Study variables	N (%)
Part involved in RTA	
Head	198 (12.08)
Face	157 (9.57)
Abdomen & Thorax	190 (11.59)
Extremities & Foot	343 (20.92)
Multiple	730 (44.53)
Severity of RTA (n=114)	
Mild	31 (27.19
Moderate	78 (68.42)
Severe	05 (4.38)
Vulnerable road users	
Pedestrian	243 (14.82)
Cyclists	35 (2.1)
Two-wheeler	1270 (77.48)
Three-wheeler	25 (1.5)
Other vehicles	66 (4.02)

Pattern of injuries

Site & severity of injury: On analyzing the site of injuries, collected of only prospective 114 cases registered as MLC in Emergency Medicine Department, JSS Hospital, it was observed that extremities, head and abdomen were most commonly 44.60% involved part (Table 1). It was noticed that among all vehicle users motorized two-wheelers were most affected (77.48%). The severity of injuries suffered by the victims was graded according to the "New injury severity score". According to the NISS, injuries are classified as mild injuries (0-7), moderate (8-18) and severe injuries (more than 18). Most 68.42% of the injuries were moderate out of 114 cases (Table 1).

Time of occurrence of injury: In the present study, a total of 1639 road traffic accident cases reported to Emergency Medicine Department at JSS Hospital, Mysuru (retrospective =1525 records based and prospective =114 cases) during the study period, among which majority of the RTA cases, 680 (44.6%) reported to the hospital between 8pm to 8am hours (Table 2).

Place, site and circumstances of injury: Out of total 1639 road traffic accident cases reported to Emergency Medicine Department at JSS Hospital Mysuru (retrospective = 1525 records based and prospective = 114 cases) during the study period, more RTAs cases were seen among rural 978 (59.67%) than urban 496 (30.26%) and 164 cases were not residence of Mysuru. Majority of the Accidents took place on main roads followed by near junctions, and crossroads. Majority of the victims were injured by hit and run while changing the lanes, etc. 913 (55.70%), 184 (11.22%) of them were injured while they were walking or riding by the side of the road (foot path). 325 (19.82%) of them were injured while fall from vehicle. While 287 (17.51%) were accompanying the rider. 460 (28.06%) were by concert in collision and other vehicle hitting the study participant were 438 (26.72%) (Table 2).

Table 2: Pattern of road traffic accidents (n=1639).

Study variable	N (%)
Time of injury	
8:00 am to 2:00 pm	304 (18.54)
2:01 pm to 8:00 pm	609 (37.15)
8:01 pm to 7:59 am	726 (44.29)
Type of impact on vehicle	
Concert in collision	460 (28.06)
Hit by self	152 (9.27)
Hit in the rear	353 (21.53)
Hit while walking	184 (11.22)
Other vehicles hitting you	438 (26.72)
Skid and fall	15 (0.91)
Hit while parked	10 (0.61)
Vehicles changing lanes	13 (0.79)
Involved animals	14 (0.85)

Antecedent Factors

Consumption of alcohol: Among the victims 2.80% gave a history of having consumed alcohol within 6 hours before the RTA, whereas 97.19% of them had not consumed. Children were marked not applicable for simplification; however, no information was collected as to the type or quantity of alcohol consumed.

Local environmental condition of the place of injury: Among 114 RTA victims (prospective data gathered from cases registered as MLC in Emergency Medicine Department, JSS Hospital) majority, 59 (51.75%) of the responded that the road on which the RTAs took place was not proper or poor visibility. 21 (18.42%) of them said that the road was wet at the time of injury. 72 (63.15%) of the victims revealed that the lighting was adequate at the time of occurrence of RTA and at the site of injury. 10 (8.77%) victims mentioned the occurrence was due to involvement of animals.

Presence of driving license and use of helmets and seat belts: Out of total 114 (prospective data gathered from cases registered as MLC in Emergency Medicine Department, JSS Hospital) 21.05% of drivers did not

have a valid driving license. Among the 110 two-wheeler users (riders and pillion) only 74 (64.91%) of them wore a helmet when they were injured whereas 40 (35.08%) of them did not wear a helmet. Only few of them were other road users. Among the Four-wheeler users none of them used seat belt.

Post-injury factors

Transportation used for reaching JSS Hospital: Out of total 1639 road traffic accident cases reported to Emergency Medicine Department at JSS Hospital Mysuru (retrospective =1525 records based and prospective =114 cases), most of the victims mentioned that there was no medical aid available at the site of injury (within 500 meters from the site of injury). The victims were brought to the hospital by private vehicle 1426 (87.0%) followed by auto 107 (6.52%) of the instances, ambulances brought the victims to the hospital 69 (4.20%) of the instances whereas 37 (2.25%) of the victims were transported by the bystanders.

DISCUSSION

Road traffic accidents (RTAs) are largely preventable, and India is currently in the early stages of addressing this epidemic. Developed nations have demonstrated significant reductions in both crash and injury rates through a comprehensive approach that encompasses safer roads, skilled drivers, secure vehicles, and an efficient transportation system. The World Health Organization (WHO) has played a pivotal role in developing safety measures to further enhance road safety globally.[1] As India continues its efforts to combat RTAs, adopting these proven strategies and collaborating with international organizations like WHO will be essential in reducing the toll of road accidents and safeguarding lives on the nation's roads. A study conducted at JSS Hospital, Mysuru, examined RTA cases over a specific time frame. The data revealed that from January 2019 to December 2021, there were a total of 1,525 reported RTA cases. Furthermore, during the period of December 2022 to January 2023, an additional 114 cases were documented. This data underscores the ongoing prevalence of RTAs in the region, necessitating continued efforts to enhance road safety and reduce such incidents. The study findings indicate a significant gender disparity in RTA cases, with a higher prevalence among males, accounting for 81.45%. Females were predominantly involved as pillion riders or occupants in 3-wheelers or 4-wheelers. Moreover, the data consistently showed a higher incidence of RTAs in the 21-30 years age category compared to the 31-40 years age group, with a majority of cases occurring during the night hours from 8pm to 8am. Several studies corroborate a consistent pattern of male predominance in RTAs. Singh et al reported an 88% male preponderance, with a notable involvement of younger age groups. Their findings also highlighted that a substantial number of RTAs occurred during the evening hours (6 pm to 12 am).[5] Similarly, Jha et al found that males were more frequently affected by RTAs than females, reinforcing the gender disparity in these incidents.[6] Umniyatun et al conducted a study that revealed 40% of total RTA cases involved adolescents and young individuals, further emphasizing the vulnerability of this age group to RTAs.[7] These collective findings underscore the need for targeted interventions and preventive measures, especially among young males, to mitigate the impact of RTAs.

This study results revealed a common pattern, with two-wheelers being the most frequent accident victims (77.48%), followed by pedestrians (14.82%). These findings align with Singh et al study, where two-wheeler users comprised 46.3% of victims, emphasizing the vulnerability of motorcycle, scooter riders and pedestrians constituted a significant portion in both studies, highlighting their susceptibility to road accidents.[5] Cyclists accounted for 14.1% of victims, indicating their risk in RTAs. Consistently, targeted safety measures are essential for these vulnerable road users. In the context of drunken driving, the present study reveals that only a small proportion, 2.8% were involved in drunk driving, while a significant majority, 97.19%, had not consumed alcohol. These findings mirror those of Singh et al study, where non-consumption of alcohol outweighed drunk driving as a factor in RTAs, and alcohol was not statistically significant in relation to RTAs.[5] In contrast, Abdallat et al study indicates a statistically significant association between RTAs and alcohol, emphasizing the differing conclusions on the role of alcohol in road accidents across various research studies.[8] Considering all the antecedent factors in this study, the usage of helmets was found to be relatively higher at 64.91%, with 78.95% having vehicle insurance, but none of the four-wheeler occupants were found to use seat belts. These findings contrast with those of Singh et al where only 28.91% of RTA victims wore helmets. Similarly, Jha et al study showed that 71.12% of RTA victims did not use helmets, and seat belt usage was nonexistent.[6] The significance of wearing helmets in reducing head injuries and fatal outcomes in two-wheeler accidents is well-established. Mandating helmet use can be a critical step in reducing crash and head injury fatalities, based on the evidence presented in these studies. The study findings indicate a higher prevalence of RTAs in rural areas, accounting for 59.67% of cases compared to 30.26% in urban areas. This pattern aligns with earlier studies conducted across India, which consistently highlight a higher incidence of accidents in rural settings. Several factors contribute to this disparity.[9] Rural areas often suffer from inadequate road infrastructure, including poorly maintained roads, insufficient signage, and limited lighting. These conditions can increase the risk of accidents due to reduced visibility and road quality. Addressing these infrastructure deficiencies and implementing targeted safety measures in rural regions is crucial to mitigate the higher occurrence of RTAs in such areas. In this study the New Injury Severity Score (NISS) which was taken for prospective 114 RTA cases registered in MLC register, 68.42% had moderate injuries, 27.9% had mild injuries

and 4.38% were severely injured. The highest score obtained among 114 RTA reported cases in this study was 29. In a study done by Lee et al found that higher is the NISS, higher is the chance mortality, which aligns with this study.[10]

Limitations

Present study findings may not be generalizable, as data was collected from a single hospital in a specific geographical location. This limited scope may not accurately represent broader trends in RTAs. Data collection during December 2022-January 2023 relied on one-on-one interviews, and inability of some informants of RTA victims to provide complete or accurate information. Furthermore, retrospective data from January 2019-December 2021, which relied on records, had to exclude cases with incomplete information, potentially affecting the comprehensiveness of the study's findings. These limitations emphasize the need for cautious interpretation of the study's results and highlight areas for further research.

CONCLUSION

Present study underscores the critical need for comprehensive public education initiatives encompassing road safety measures, driver safety practices, road signage awareness, and the importance of using signal lights. Promoting the use of helmets and seat belts is vital. It serves as a valuable reminder of the significance of comprehensive evaluation and intervention strategies to enhance road safety and mitigate the impact of RTAs on individuals and society. This study highlights the critical factors contributing to Road Traffic Accidents among all age groups and underscores the importance of addressing these factors to foster the development of a safer road travel in the near future.

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