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Evaluation Of Injury Patterns In Road Traffic Accidents – A Medicolegal Analysis.

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ABSTRACT

Road traffic accidents (RTAs) are a leading cause of trauma and mortality worldwide, with significant medicolegal and public health implications. Understanding injury patterns and associated factors is essential for forensic analysis and preventive strategies. To evaluate the injury patterns in victims of RTAs and analyze their medicolegal relevance. A retrospective study was conducted over one year in the Department of Forensic Medicine at a tertiary care hospital. A total of 40 medicolegal autopsy cases of RTA victims were included. Data were collected from post-mortem reports, police records, and hospital documentation. Variables such as age, gender, role at the time of accident, type and distribution of injuries, and use of safety devices were analyzed. Statistical analysis was performed using descriptive methods. The most affected age group was 21–40 years (45%), with males comprising 75% of the cases. Pedestrians (35%) and two-wheeler riders (30%) were the most common victims. Head injuries (70%) were the predominant cause of death, followed by chest injuries (50%). Use of safety devices was notably low, with increased mortality among non-users. Head injuries were the most frequent and fatal. Proper enforcement of safety measures and awareness can significantly reduce RTA-related mortality.
Keywords: Road Traffic Accidents, Injury Pattern, Medicolegal Analysis

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INTRODUCTION

Road traffic accidents (RTAs) are a major public health concern worldwide, resulting in significant morbidity, mortality, and socioeconomic burden [1]. In India, the rapid rise in vehicular traffic, coupled with inadequate infrastructure and non-compliance with traffic regulations, has led to an alarming increase in the incidence of RTAs [2, 3]. These accidents not only affect the lives of victims and their families but also have far-reaching medicolegal implications [4]. Understanding the pattern and distribution of injuries sustained in RTAs is essential for clinicians, forensic experts, and law enforcement agencies to determine the mechanism of injury, reconstruct the events, and assign responsibility where needed.

Injury patterns vary depending on the type of collision, speed of impact, use of protective devices like helmets and seat belts, and the position of the victim—whether pedestrian, driver, or passenger [5, 6]. A systematic evaluation of these injuries can provide valuable insight into the nature of trauma, potential fatality, and manner of death. From a medicolegal perspective, accurate documentation and analysis of injuries play a crucial role in criminal investigations, insurance claims, and judicial proceedings. This study aims to evaluate the injury patterns in victims of RTAs and to analyze their medicolegal significance, thereby contributing to preventive strategies and the administration of justice.

METHODOLOGY

This descriptive, retrospective study was conducted over a period of one year in the Department of Forensic Medicine at a tertiary care hospital. The study included a total of 40 medicolegal autopsy cases of road traffic accident (RTA) victims brought to the department for post-mortem examination. Ethical clearance was obtained from the institutional ethics committee prior to the commencement of the study. Informed consent from legal representatives was taken when applicable.

Cases were selected based on inclusion criteria which consisted of victims of RTAs who were declared dead at the scene or succumbed to their injuries during hospitalization. Exclusion criteria included cases where the cause of death was unrelated to road traffic trauma or where complete information was unavailable. Relevant data were collected from hospital records, police reports, inquest papers, and post-mortem examination reports.

Each case was thoroughly analyzed for demographic details such as age, sex, occupation, and time of accident. Detailed external and internal injuries were noted, including their location, type, severity, and fatality. The mode of transportation, position of the victim at the time of the accident (pedestrian, driver, or passenger), and the use of safety devices like helmets or seat belts were also recorded where available.

The data collected were tabulated and subjected to statistical analysis. Descriptive statistics were used to determine the frequency and distribution of injury patterns. The findings were correlated with the nature of the accident to identify common trends and associations. The medicolegal implications of the injuries were evaluated to understand their relevance in determining the cause of death and reconstructing the events leading to the fatality.

RESULTS

Table 1: Demographic Distribution of RTA Victims (n = 40)

Parameter	Number of Cases	Percentage (%)
Age Group (years)		
<20	6	15.0
21–40	18	45.0
41–60	10	25.0
>60	6	15.0
Gender		
Male	30	75.0
Female	10	25.0

Table 2: Role of Victim at Time of Accident

Role of Victim	Number of Cases	Percentage (%)
Pedestrian	14	35.0
Two-wheeler Rider	12	30.0
Four-wheeler Driver	6	15.0
Passenger (any vehicle)	8	20.0

Table 3: Types and Distribution of Injuries

Type of Injury	Number of Cases	Percentage (%)
Head Injury	28	70.0
Chest Injury	20	50.0
Abdominal Injury	10	25.0
Limb Fractures	18	45.0
Polytrauma	15	37.5

Table 4: Safety Device Usage and Survival Time

Safety Measure	Used	Not Used	Death at Scene	Died in Hospital
Helmet (2-wheeler)	3	9	8	4
Seatbelt (4-wheeler)	2	4	3	3
Total (n = 18)*	5	13	11	7

DISCUSSION

The present study evaluated injury patterns in road traffic accidents (RTAs) based on 40 medicolegal autopsy cases over one year. The analysis revealed significant insights into the demographics, nature of trauma, role of victims, and the effectiveness of safety measures such as helmets and seatbelts.

In our study, the most affected age group was 21–40 years, comprising 45% of the total cases. This finding aligns with several other studies, which report that young adults are at the highest risk for RTAs due to increased mobility, occupational travel, and high-risk behaviors such as rash driving and alcohol use. Males accounted for 75% of the fatalities, which may be attributed to their greater exposure to traffic as drivers and two-wheeler riders. These findings underscore the importance of targeting road safety awareness and enforcement programs toward young male adults.

When examining the role of the victim during the accident, pedestrians (35%) and two-wheeler riders (30%) formed the bulk of the victims. Pedestrians are among the most vulnerable road users, often lacking physical protection and often unaware of traffic hazards. Two-wheeler riders, particularly in India, are at high risk due to poor road discipline, lack of protective gear, and congested traffic conditions. Four-wheeler drivers and passengers constituted 15% and 20% of the cases respectively, reflecting a comparatively lower risk, potentially due to better vehicle protection.

The analysis of injury types indicated that head injuries were the most common, seen in 70% of the cases. This emphasizes the critical role of the head as the most vulnerable site during vehicular trauma. The predominance of head injury is consistent with existing literature, particularly in cases involving pedestrians and two-wheeler riders. Chest injuries (50%) and limb fractures (45%) were also common, especially in high-impact collisions and ejections from vehicles. Abdominal injuries were less frequent (25%) but potentially fatal, especially in cases involving blunt force trauma. A significant number of cases (37.5%) showed polytrauma, which reflects the high-energy impact in many RTAs, resulting in multiple injuries and increased mortality risk [7-9].

Our findings strongly highlight the lack of use of safety devices. Among two-wheeler riders, only 3 out of 12 had worn helmets, and among four-wheeler occupants, only 2 out of 6 had used seatbelts. Death at the scene was more common among those who did not use safety gear, underscoring the life-

saving potential of such protective devices. The data suggest a clear association between non-use of helmets or seatbelts and early mortality following the accident.

The study reiterates the importance of timely interventions such as enforcement of helmet and seatbelt laws, improved road infrastructure, and public education campaigns on road safety. In addition, the documentation of injury patterns has considerable medicolegal significance in reconstructing the events of accidents, identifying the nature and mechanism of trauma, and determining the cause of death.

CONCLUSION

Overall, this medicolegal analysis highlights the need for a multidisciplinary approach involving traffic authorities, healthcare providers, forensic experts, and policymakers to reduce the burden of road traffic injuries and fatalities in India.

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