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RESEARCH ARTICLE
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"EPIDEMIOLOGICAL STUDY OF VICTIMS OF TWO-WHEELER ROAD TRAFFIC ACCIDENTS"

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Abstract
Road traffic accidents (RTAs) involving two-wheelers pose a critical public health challenge in India, contributing significantly to morbidity and mortality. This prospective observational study analysed the epidemiological profile, injury patterns, and outcomes of 400 two-wheeler accident victims admitted to the Department of Surgery, Government Medical College, Jammu, over one year. The majority of victims were young males (mean age 24.33 years), with 88% being male and 87% being drivers. Helmet usage was low (24.5%), correlating with a high incidence of head and neck injuries (31.16%) and multiple trauma (74%). Behavioural risk factors included alcohol use (7.25%) and mobile phone use (3%). Most cases were managed conservatively (86.75%), with a mortality rate of 10.25%. The study underscores the urgent need for improved helmet compliance, stricter enforcement of traffic laws, public awareness campaigns, and enhancement of trauma care systems to reduce the burden of two-wheeler-related RTAs.

Keywords: RTA, two wheeler, epidemiology, GMC JAMMU

Introduction

Road traffic accidents (RTAs) are among the most significant public health challenges of the modern era, contributing to a considerable burden of mortality, morbidity, and disability worldwide. According to the World Health Organization's (WHO) Global Status Report on Road Safety 2018, road traffic injuries are the eighth leading cause of death worldwide and the leading cause of death among individuals aged 10 to 35 years. The impact of these accidents is particularly dangerous among low- and middle-income countries like in India, Pakistan, Bangladesh and others, where over 80-90% of road traffic accidents occur, despite these regions possessing only about 50-60% of the world's vehicles. This disproportionate burden requires the need for region-specific epidemiological studies to guide policy and other preventive strategies.

In India, this situation is dangerous and need immediate solution. As per the National Crime Records Bureau (NCRB) report for 2019, there were over 150,000 deaths and more than 430,000 injuries attributed to road traffic accidents(1). In Delhi alone, there were a total of 8085 road traffic accident cases, with 1622 deaths in 2015(2). Among all types of vehicles, two-wheelers contribute to the highest number of fatalities and injuries, primarily because of their increasing usage, lack of physical

protection, and vulnerability in traffic environments. The two-wheeler population in India has surged in recent decades, driven by economic affordability, ease of maneuverability in congested urban areas, and inadequate public transport infrastructure. However, this rapid rise has not been matched with corresponding improvements in road safety awareness or enforcement of protective measures, making two-wheeler users one of the most at-risk groups on Indian roads. To develop efficient road safety mechanisms and to effectively address prehospital care in RTIs, epidemiological data are extremely important(3).

Two-wheelers, by their very nature, are inherently unstable and lack the protective enclosures found in other vehicles, such as cars or buses. This structural disadvantage, coupled with human behavioural factors like speeding, alcohol consumption, mobile phone use, and helmet non-compliance, significantly raises the risk of severe injuries or fatalities during crashes(4). The open design of motorcycles and scooters exposes riders to direct impact during collisions, which often results in polytrauma, particularly to the head, limbs, and thoracoabdominal regions. In addition, pillion riders—especially females and children—are equally susceptible to injuries but often receive less attention in road safety discourse.

Despite the grim statistics, comprehensive data on the injury patterns, risk factors, and outcomes of two-wheeler accidents in Indian settings is still limited. Most available data is aggregated or derived from police records, which often lack clinical correlation and do not provide a complete picture of injury severity, management outcomes, or the effectiveness of preventive measures such as helmets. This knowledge gap hampers the development of targeted interventions aimed at reducing the frequency and severity of two-wheeler-related accidents.

Helmet use, in particular, has emerged as a crucial preventive measure. Other Studies have consistently shown that helmets can reduce the risk of head injury by up to 60-70 % and death by nearly 40-50%. However, compliance remains low due to a combination of factors such as discomfort, lack of enforcement, poor public awareness, and socio-cultural attitudes. Moreover, even when helmets are worn, substandard or improperly fastened helmets fail to provide adequate protection, further complicating injury outcomes. Evaluating the real-world effectiveness of helmet use among accident victims is essential to shaping public safety campaigns and legal frameworks.

Understanding the epidemiological profile of two-wheeler accident victims—demographics, behaviour at the time of the accident, nature of injuries sustained, and treatment outcomes—can offer valuable insights into the modifiable risk factors and emergency care needs associated with such incidents. It also enables healthcare systems to plan better trauma care facilities, prehospital services, and rehabilitation programs for accident survivors.

This study was conducted with all these factors and urgency in mind. By evaluating a cohort of 400 two-wheeler accident victims admitted to the emergency department of Government Medical College, Jammu, over a period of one year, this study aims to provide an in-depth analysis of the injury patterns, associated risk factors, and effectiveness of preventive measures like helmet use. The study also highlights the clinical management outcomes, including the proportion of patients managed conservatively versus surgically and the associated mortality.

Objectives:

The objectives of out study was:

1. To examine the epidemiological profile of victims of two-wheeler road traffic accidents.
2. To identify contributing factors such as alcohol use, mobile phone use, and collision types.
3. To assess the protective role of helmets in reducing injury severity and mortality.

By addressing these objectives, our research hopes to contribute valuable, context-specific data to the ongoing discourse on road safety and trauma management in India. It reinforces the urgent need for multi-sectoral approaches involving policy makers, urban planners, healthcare professionals, and the general public to mitigate the devastating human and economic costs of two-wheeler accidents

Materials and Methods

This research was a prospective observational study, undertaken in the Department of Surgery at Government Medical College, Jammu. The study focused on victims of two-wheeler road traffic accidents (RTAs) who were admitted to the emergency ward and subsequently managed in the surgical department. The study spanned over a defined period during which 400 patients were enrolled and evaluated.

The inclusion criteria consisted of all patients who were victims of two-wheeler-related RTAs, irrespective of age or gender, and who presented to the emergency department during the study period. These patients were subsequently admitted under surgical care for evaluation and management of their injuries. Patients involved in other types of vehicular accidents (such as four-wheelers or heavy vehicles) or those with pre-existing conditions influencing trauma outcomes were excluded from the study to maintain homogeneity.

Upon admission, detailed clinical assessments were conducted, which included primary and secondary surveys as per ATLS (Advanced Trauma Life Support) guidelines. Relevant investigations were ordered, including but not limited to X-rays, CT scans, ultrasonography (FAST), and routine haematological and biochemical profiles. These investigations helped in identifying the nature, location, and severity of the injuries sustained.

Patients were monitored throughout their stay in the hospital, and data were collected regarding demographic variables (age, sex), nature of accident, whether the victim was a rider or pillion passenger, use of safety gear (especially helmets), timing of the accident (day/night), and presence of alcohol intoxication. Additionally, information on the mechanism of injury, anatomical regions involved (head, chest, abdomen, extremities), and the type of injuries (fractures, lacerations, intracranial haemorrhage, etc.) was meticulously documented.

The treatment modalities administered were also recorded, whether surgical or conservative. Airway assessment was done to check the need of intubation.Surgical interventions included procedures such as open reduction and internal fixation of fractures, craniotomy for head injuries, and exploratory laparotomies in cases of intra-abdominal trauma. Patients requiring ICU care were noted, and the length of hospital stay was tracked. The outcome was assessed in terms of recovery, morbidity, and mortality.

Throughout our study time , a structured performa was used to ensure consistency and accuracy in data collection. All patient data were anonymised, and ethical clearance was obtained from the institutional ethical committee before the initiation of the study. Written informed consent was secured from the patients or their legal guardians where necessary.

Results and observation:

RESULTS & OBSERVATIONS

In this study, a prospective observational analysis was conducted using data collected from patients involved in road traffic accidents over a defined period. The sample included a total of 400 individuals, and data were categorised and analysed based on variables such as body region injured, mechanism of injury, imaging findings, airway management, clinical outcomes, and demographic details. Frequencies and percentages were used to summarise categorical variables. Statistical interpretation focused on identifying common injury patterns, roles of victims, and outcomes to evaluate the nature and severity of trauma. The data were compiled from clinical records, imaging reports, and emergency department documentation, ensuring a comprehensive overview of injury characteristics and management strategies.

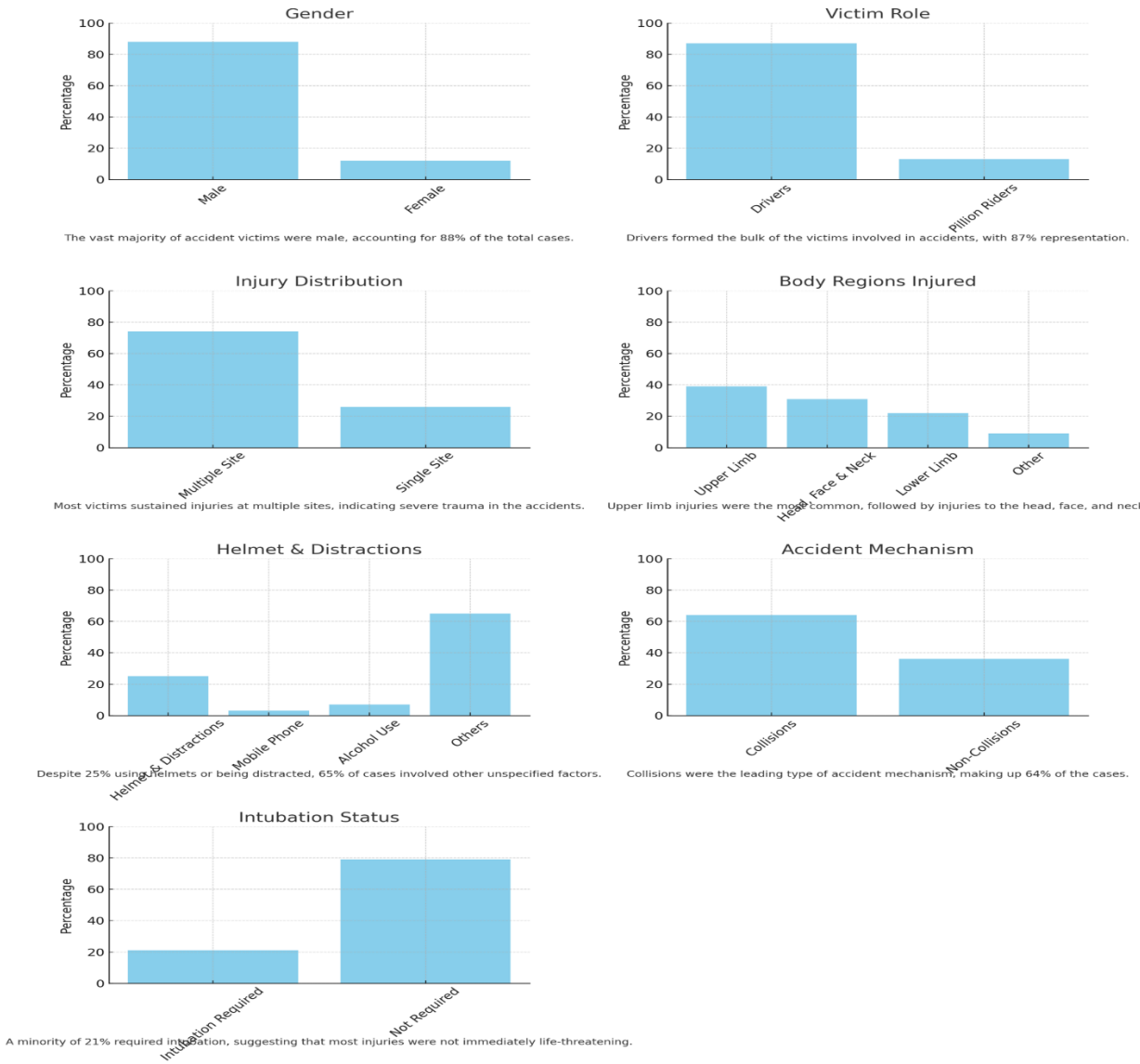

Table 1. Distribution of study participants according to gender.

Gender	Frequency (N=400)	Percentage
Male	352	88%
Female	48	12%

The gender distribution data shows a clear predominance of male victims, with 352 cases accounting for 88% of the total. Female victims represent only 48 cases or 12%. This significant disparity suggests that males are far more frequently involved in the reported incidents, possibly reflecting differences in exposure, behaviour, or activity patterns related to the context of the injuries.

Table 2. Distribution of study participants according to victim role.

Victim Role	Number	Percentage
Drivers	347	87%
Pillion Riders	53	13%

The data on victim roles reveals that drivers constitute the overwhelming majority of cases, with 347 individuals or 87% of the total. Pillion riders make up a much smaller proportion, accounting for only 53 cases or 13%. This indicates that drivers are significantly more likely to be injured in the incidents reported, highlighting their increased exposure and risk compared to passengers.

Table 3. Distribution of study participants according to mode of injury.

Injury Distribution	Number	Percentage
Multiple Site	296	74%
Single Site	104	26%

The injury distribution data shows that a significant majority of cases, 296 or 74%, involved multiple injury sites, indicating widespread trauma in most patients. In contrast, only 104 cases, or 26%, were limited to a single site of injury. This suggests that multi-site injuries are far more common, underscoring the severity and complexity often associated with these cases.

Table 4. Distribution of Most Common Body Regions Injured.

	Number	Percentage
Upper Limb	154	39%
Head, Face & Neck	125	31%
Lower Limb	86	22%
Other	35	9%

The table shows that the most injured body region is the upper limb, accounting for 154 cases or 39% of the total injuries. This is followed by injuries to the head, face, and neck, which represent 125 cases or 31%. Lower limb injuries are the third most frequent, comprising 86 cases or 22%. Injuries classified under "Other" make up the smallest portion, with 35 cases or 9%. Overall, upper limb and head-related injuries together constitute a significant majority of all reported cases.

Table 5 Distribution of study participants Helmet Use & Distractions.

	Number	Percentage
Helmet Use	98	25%
Mobile Phone use	12	3%
Alcohol Use	29	7%
Others	261	65%

The table indicates that the majority of cases, 261 or 65%, fall under the "Others" category, suggesting various unspecified factors contributing to incidents. Helmet use combined with distractions accounts for 98 cases or 25%, making it the most significant specific contributor. Alcohol use is involved in 29 cases (7%), while mobile phone use is the least common distraction, cited in only 12 cases (3%). Overall, distractions and risky behaviors, particularly those involving helmets, contribute to a notable portion of the incidents, though the largest share remains broadly categorized.

Table 6. Distribution of Mechanisms & Type of accidents.

	Number	Percentage
Collisions	255	64%
Non-Collisions	145	36%

The data shows that collisions are the leading mechanism of accidents, accounting for 255 cases or 64% of the total. In contrast, non-collision incidents make up 145 cases or 36%. This indicates that most accidents involve direct impact with other objects or vehicles, highlighting the prevalence of collision-related incidents over other types of accidents.

Table 7. Distribution of study participants Radiological & Imaging Findings.

		Number	Percentage
Chest X-Ray	Fracture	78	20%
	Pneumohemothorax	50	13%
FAST	Positive	62	16%
CT scan	Cranial & Facial Fractures	195	49%
	Intracranial Injuries	129	32%
	Intra-abdominal injuries	59	15%

The radiological and imaging findings reveal that cranial and facial fractures identified through CT scans are the most common, reported in 195 cases or 49%. Intracranial injuries, also detected via CT, follow at 129 cases (32%). Chest X-rays show fractures in 78 cases (20%) and pneumohemothorax in 50 cases (13%). FAST scans indicate positive findings in 62 cases (16%), and intra-abdominal injuries are observed in 59 cases (15%) via CT. Overall, CT imaging plays a crucial role in diagnosing severe head and internal injuries, reflecting its significance in trauma assessment.

Table 8. Distribution of study participants according to airway management.

Airway management	Number	Percentage
Intubation	84	21%
Normal airway	316	79%

The data on airway management shows that the majority of patients, 316 cases or 79%, were managed using Jaw Thrust or other basic airway techniques (JOT). In contrast, endotracheal intubation was required in 84 cases, accounting for 21%. This suggests that while most cases could be handled with non-invasive airway methods, a significant portion still required advanced airway intervention.

Table 9. Distribution of Management & Outcomes.

	Number	Percentage
Conservative Management	347	87%
Surgical Interventions	23	6%
Mortality rate	41	10%

The data on management and outcomes indicates that most cases, 347 or 87%, were treated with conservative management, suggesting non-surgical approaches were sufficient in most situations. Surgical interventions were performed in only 23 cases, accounting for 6%, reflecting a relatively low need for operative treatment. The mortality rate stands at 10%, with 41 reported deaths, highlighting a notable fatality rate despite the predominance of conservative care.

Conclusion: This study highlights the alarming prevalence and severity of two-wheeler road traffic accidents, particularly among young male drivers. The findings reveal significant risks due to poor helmet usage, alcohol consumption, and distracted driving. Most injuries involved multiple body regions, with a high incidence of head trauma and upper limb injuries. Although the majority were managed conservatively, the mortality rate underscores the need for timely intervention. To reduce these preventable injuries and deaths, there must be stricter enforcement of traffic laws, enhanced public awareness campaigns, and improvements in road safety infrastructure and emergency medical care. Prevention remains the most effective strategy.

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