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To Study the Analysis of Road Traffic Injuries Presented to the Emergency Department in the Eastern Province of RH Kalamb, Yavatmal, Maharashtra

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Abstract

Road traffic injuries (RTIs) are a major public health problem and one of the leading causes of mortality and disability worldwide. In India, the increasing number of vehicles, poor road conditions, and unsafe driving practices contribute significantly to the burden of RTIs. To analyze the pattern of road traffic injury cases presented to the Emergency Department of Rural Hospital, Kalamb, Yavatmal, Maharashtra. A hospital-based retrospective descriptive observational study will be conducted using hospital records of patients with road traffic injuries. Data regarding demographic profile, type of vehicle, mechanism of injury, injury pattern, treatment, and patient outcomes will be collected and analyzed using Microsoft Excel and SPSS. Descriptive and inferential statistical methods will be applied, with a p-value of <0.05 considered statistically significant. The study is expected to identify the demographic characteristics, common causes, injury patterns, severity, and outcomes of road traffic injury cases. The findings are expected to identify high-risk groups and factors associated with road traffic injuries. The study is expected to provide valuable evidence for improving emergency trauma care, strengthening road safety measures, and supporting preventive interventions in the rural population.

Keyword: Road Traffic Injury (RTI), Road Traffic Accident (RTA), Emergency Department, Trauma, Injury Pattern, Road Safety, Rural Hospital, Epidemiology, Maharashtra, Public Health

Introduction

Road traffic injuries (RTIs) are a major public health concern and one of the leading causes of death and disability worldwide. They contribute significantly to morbidity, mortality, and economic burden, especially in low- and middle-income countries like India. Factors such as speeding, alcohol consumption, non-use of helmets and seat belts, poor road conditions, and increasing vehicle numbers contribute to the rising incidence of road traffic accidents ^[1].

The emergency department plays a vital role in the immediate assessment and management of road traffic injury victims. Studying the pattern of RTIs helps identify high-risk groups, common injury types, and factors associated with

accidents, which are essential for improving trauma care and planning preventive measures ^[2].

Therefore, the present study aims to analyze the demographic profile, injury pattern, and outcomes of road traffic injury cases presenting to the Emergency Department of Rural Hospital, Kalamb, Yavatmal, Maharashtra. The findings may help improve emergency services and support effective road safety strategies ^[3].

Background of the Study

Road traffic injuries (RTIs) are a major cause of death and disability worldwide, particularly in developing countries like India. Rapid urbanization, increasing vehicle ownership, poor road infrastructure, and unsafe driving practices have

contributed to the growing number of road traffic accidents. RTIs place a significant burden on healthcare services, especially emergency departments, where prompt diagnosis and treatment are essential to improve patient outcomes [4].

Need of the Study

Understanding the pattern and characteristics of road traffic injuries is essential for improving trauma care and developing effective road safety measures. Rural areas such as Kalamb, Yavatmal have limited published data on RTIs. This study will provide valuable information on the demographic profile, injury patterns, causes, and outcomes of road traffic injury cases presenting to the Emergency Department of Rural Hospital, Kalamb. The findings will help healthcare professionals and policymakers strengthen emergency services, allocate resources efficiently, and implement preventive strategies to reduce road traffic injuries.

Review of Literature

Road Traffic Accidents (RTAs) are a major public health concern and one of the leading causes of injury and death worldwide. Several studies have evaluated the causes, patterns, severity, and preventive measures related to road traffic injuries.

Gonzalez *et al.* (2016) and Elvik (2019) reported that human factors such as speeding, alcohol consumption, distracted driving, and violation of traffic rules are the leading causes of road traffic accidents [5]. Vanlaar *et al.* (2014) found that young adults, particularly males, are more likely to engage in risky driving behaviors, increasing their risk of accidents. Vehicle-related factors also influence accident occurrence and severity [6]. Tarko *et al.* (2015) observed that poorly maintained vehicles and the absence of safety features such as airbags and anti-lock braking systems increase the likelihood of severe injuries [7]. Similarly, Asmat *et al.* (2020) reported that larger and high-powered vehicles are associated with more serious crashes. Environmental factors contribute significantly to RTAs. Adekoya *et al.* (2018) identified poor road conditions, inadequate lighting, and adverse weather as important contributors to accidents. Lerner *et al.* (2017) emphasized that proper road design, adequate signage, and improved visibility can reduce accident rates [8].

Studies on accident patterns indicate that RTAs occur more frequently during evening hours and in areas with heavy

4. Sample Selection Criteria

Inclusion Criteria	Exclusion Criteria
All patients with road traffic injuries presenting to the Emergency Department during the study period.	Patients with incomplete medical records.
Patients of all age groups and both sexes.	Non-road traffic injuries (falls, assaults, burns, etc.).
Cases with complete demographic and clinical information.	Patients brought dead or with unavailable records, if applicable.

5. Data Collection

Data will be collected retrospectively from hospital emergency registers, medico-legal case records, inpatient records, and case sheets using a predesigned data collection form. Information such as age, gender, type of vehicle, mechanism of injury, time of accident, site of injury, treatment provided, and patient outcome will be recorded.

6. Study Variables

The following variables will be analyzed:

- Age and gender
- Type of road user/vehicle involved

traffic. Mullan *et al.* (2019) found a higher incidence of accidents during evening rush hours due to traffic congestion and driver fatigue [9]. Akinmoladun *et al.* (2020) reported that urban areas experience more accidents, whereas rural areas often have more severe injuries because of higher vehicle speeds and delayed emergency medical care. Regarding injury severity, Wang *et al.* (2018) demonstrated that high-speed collisions and crashes involving heavy vehicles are associated with greater morbidity and mortality [10]. Zhao *et al.* (2017) observed that accidents involving pedestrians and those occurring at intersections frequently result in severe injuries due to increased vulnerability and reduced reaction time [11].

Several studies have highlighted the importance of preventive strategies. Strict enforcement of traffic laws, mandatory helmet and seat-belt use, improved road infrastructure, public awareness campaigns, and strengthening emergency trauma care have been shown to reduce both the incidence and severity of road traffic injuries. Overall, the available literature indicates that road traffic injuries remain a significant public health challenge. However, limited hospital-based data are available from rural regions such as Kalamb, Yavatmal. Therefore, the present study aims to analyze the demographic profile, injury patterns, and outcomes of road traffic injury cases presenting to the Emergency Department of Rural Hospital, Kalamb, to provide evidence for improving trauma care and road safety interventions.

Research Methodology [12, 13]

1. Research Design

The present study is a hospital-based retrospective descriptive observational study conducted to analyze the pattern, causes, and outcomes of road traffic injury (RTI) cases presenting to the Emergency Department.

2. Study Area

The study will be conducted at the Emergency Department of Rural Hospital, Kalamb, Yavatmal, Maharashtra, which caters to trauma patients from Kalamb and the surrounding rural areas.

3. Study Population

The study population will include all patients with road traffic injuries who presented to the Emergency Department of Rural Hospital, Kalamb, during the study period.

- Time and day of accident
- Mechanism of injury
- Pattern and severity of injuries
- Use of helmet/seat belt (if documented)
- Treatment provided
- Outcome (discharged, admitted, referred, or death)

7. Data Analysis

The collected data will be entered into Microsoft Excel and analyzed using SPSS (Statistical Package for the Social Sciences). Descriptive statistics such as frequencies,

percentages, mean, and standard deviation will be used. Appropriate statistical tests (Chi-square test and others where applicable) will be applied, and a p-value < 0.05 will be considered statistically significant.

8. Ethical Considerations

Ethical approval will be obtained from the Institutional Ethics Committee before the commencement of the study. Patient confidentiality will be maintained by anonymizing all collected data, and information will be used solely for research purposes.

Table 1: Summary of the Research Methodology for the Analysis of Road Traffic Injury Cases Presented to the Emergency Department of Rural Hospital, Kalamb, Yavatmal, Maharashtra

Particular	Description
Research Approach	Quantitative approach.
Research Design	Hospital-based retrospective descriptive observational study.
Study Setting	Emergency Department, Rural Hospital (RH), Kalamb, Yavatmal, Maharashtra.
Study Duration	2024–2026 (or as per study protocol).
Study Population	All patients presenting with road traffic injuries (RTIs) to the Emergency Department during the study period.
Sample Size	All eligible RTI cases recorded during the study period.
Sampling Technique	Purposive sampling using hospital records.
Inclusion Criteria	• All RTI patients of any age and gender. • Patients presenting to the Emergency Department. • Complete medical records available.
Exclusion Criteria	• Incomplete hospital records. • Non-road traffic injuries (falls, burns, assaults, etc.). • Patients with insufficient information.
Data Sources	Emergency Department register, Medico-Legal Case (MLC) register, inpatient records, discharge summaries, and case sheets.
Data Collection Method	Retrospective review of hospital records using a structured data collection proforma.
Variables Collected	Age, gender, occupation, residence, date and time of accident, type of road user, type of vehicle, mechanism of injury, use of helmet/seat belt, alcohol history (if available), injury pattern, body region injured, treatment provided, hospital stay, and outcome.
Data Collection Tool	Pre-designed and pre-tested data collection proforma.
Data Entry	Data will be entered into Microsoft Excel after checking for completeness and accuracy.
Statistical Analysis	Data will be analyzed using SPSS. Descriptive statistics (frequency, percentage, mean, standard deviation) and inferential statistics (Chi-square test/Fisher's exact test where applicable) will be used. A p-value < 0.05 will be considered statistically significant.
Outcome Measures	Pattern of road traffic injuries, demographic characteristics, mechanism of injury, injury severity, treatment, and patient outcomes.
Ethical Considerations	Approval will be obtained from the Institutional Ethics Committee. Confidentiality of patient information will be maintained, and all data will be used only for research purposes.
Limitations	Retrospective hospital-based study; findings depend on the accuracy and completeness of medical records and may not represent all RTI cases in the community.

Analysis and Interpretation of the Data

The collected data will be checked for completeness, accuracy, and consistency before analysis. After verification, the data will be entered into Microsoft Excel and exported to Statistical Package for the Social Sciences (SPSS) for statistical analysis. Descriptive statistics such as frequencies, percentages, mean, and standard deviation will be used to summarize the demographic characteristics of the patients, including age, gender, occupation, and residence. The distribution of road traffic injury cases according to the type of road user, type of vehicle involved, time and day of the accident, mechanism of injury, and anatomical site of injury will also be analyzed and presented in the form of tables, bar charts, and pie charts.

The clinical characteristics of patients, including the severity of injuries, treatment provided, duration of hospital stay, and final outcome (discharge, admission, referral, or death), will be analyzed using descriptive statistical methods. Cross-tabulation will be performed to compare variables such as age group, gender, type of vehicle, and injury severity. Inferential statistical tests, including the Chi-square test, will be used to determine the association between categorical

9. Limitations

- The study is based on retrospective hospital records; therefore, incomplete or missing data may affect the analysis.
- The study is limited to a single rural hospital and may not represent the entire district or state population.
- Information regarding behavioral factors (e.g., alcohol consumption or mobile phone use) may not be available in all records.

variables wherever applicable. A p-value of less than 0.05 will be considered statistically significant.

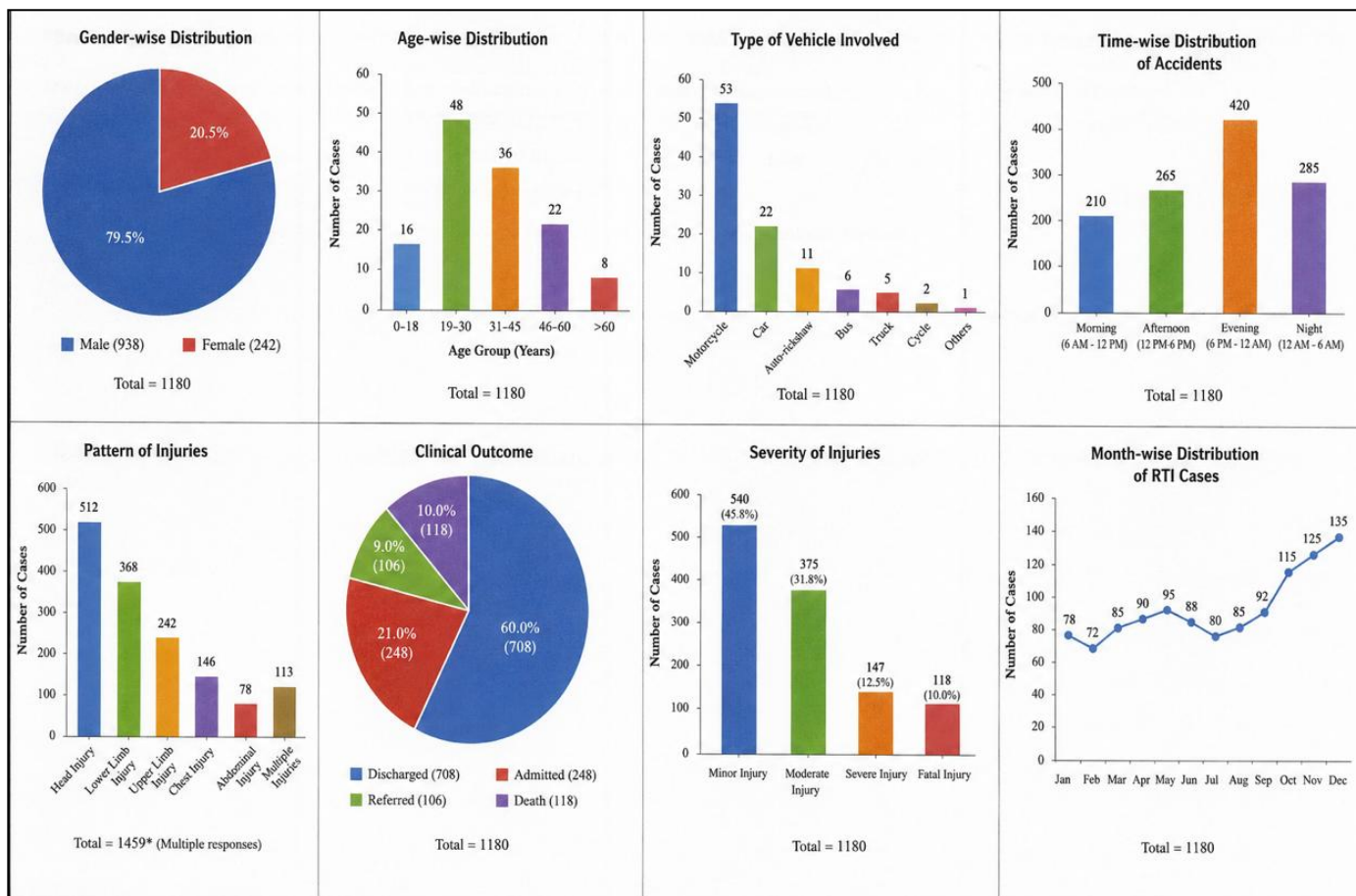
The results obtained from the analysis will be interpreted in relation to the objectives of the study and compared with findings from previously published literature. The analysis is expected to identify the demographic profile of road traffic injury victims, common causes and patterns of injuries, high-risk groups, and factors associated with injury severity. The findings will help in understanding the burden of road traffic injuries presenting to the Emergency Department of Rural Hospital, Kalamb, Yavatmal, Maharashtra, and will provide useful evidence for improving emergency trauma care, planning preventive strategies, and strengthening road safety measures.

Results

The results of the study will be presented in the form of tables, graphs, and charts. The analysis is expected to describe the age and gender distribution of patients, type of vehicles involved, time and mechanism of accidents, pattern and severity of injuries, treatment provided, and patient outcomes. Statistical analysis will be performed to determine

the association between demographic and clinical variables. The findings are expected to identify the most affected

population groups and the common factors associated with road traffic injuries.



Discussion

the study findings provides a clear understanding of the demographic profile, accident characteristics, injury patterns, and clinical outcomes of road traffic injury (RTI) cases presented to the Emergency Department of Rural Hospital, Kalamb. The graphs are expected to demonstrate that young adults (19–30 years) constitute the largest proportion of RTI victims, as this age group is more actively involved in education, employment, and travel, increasing their exposure to road traffic. The male population is expected to account for the majority of cases, reflecting greater vehicle use and higher engagement in risk-taking behaviors. The vehicle-wise distribution is expected to show that motorcycles are the most frequently involved vehicles in road traffic injuries, which is consistent with the widespread use of two-wheelers in rural and semi-urban areas. The graphs depicting the time of accidents are expected to indicate a higher incidence during the evening and night hours, when reduced visibility, increased traffic, fatigue, and hurried driving contribute to a greater risk of accidents.

The injury pattern graph is expected to reveal that head injuries, lower limb injuries, and multiple injuries are the most common forms of trauma. This finding may reflect inadequate use of protective devices such as helmets and the high impact associated with motorcycle crashes. The outcome graph is expected to demonstrate that most patients receive emergency treatment and are discharged, while a smaller proportion require hospital admission, referral to higher healthcare centers, or result in mortality depending on injury severity. Overall, the graphical analysis is expected to highlight the burden of road traffic injuries among the young and economically productive population. These findings

emphasize the need for strict enforcement of traffic regulations, promotion of helmet and seat belt use, improvement of road infrastructure, public awareness programs, and strengthening of emergency trauma care services. The graphical presentation facilitates easy interpretation of the data and supports the study objectives by identifying high-risk groups and factors associated with road traffic injuries.

Conclusion

Road traffic injuries (RTIs) continue to be a major public health problem, particularly in developing countries such as India. They contribute significantly to morbidity, mortality, disability, and socioeconomic burden. The present study aims to analyze the demographic profile, injury patterns, causes, severity, and clinical outcomes of road traffic injury cases presenting to the Emergency Department of Rural Hospital, Kalamb, Yavatmal, Maharashtra. The findings are expected to identify high-risk groups, common mechanisms of injury, and factors associated with road traffic accidents. The study will provide valuable evidence to improve emergency trauma care, strengthen road safety measures, promote awareness regarding safe driving practices, and support policymakers in planning effective preventive strategies. Overall, the study is expected to contribute to reducing the burden of road traffic injuries and improving patient outcomes in the rural population.

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