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Original Research Article

A Prospective Assessment of Fatal Head Injuries in Road Traffic Accidents in the Bundelkhand Region

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Abstract:

Along with growing urbanization and motorization, India is undergoing a significant economic and demographic shift. Road infrastructure issues, encroachments into pedestrian-safe areas, a lack of safety engineering measures, the mix of traffic, an increase in the number of motorized vehicles, unsafe driving practices, and a lack of valid licenses are some of the factors that raise the risk of road traffic accidents in India.

The study was conducted with the aim to determine the severity of the issue in relation to various host variables.

The study was conducted in the Bundelkhand region and is the first of its kind in this area. A prospective study of fatal head injury patients was conducted. All the statistical analysis was done using IBM SPSS statistics 26.0. 31 to 50 were the most susceptible, followed by age 21 to 30. Men made up 87% of the victims in this age range. Two-wheeler riders and pedestrians made up 87% of the casualties.

The study concludes that we strongly need to record all traffic accidents nationwide; a national-level registry has to be set up.

Keywords: Road traffic accident, Head Injury, types of injury.

Introduction

Road traffic accidents (RTAs) previously ranked tenth among the top ten causes of death in the nation, but due to expanding urban areas and changing lifestyles, it is predicted that by 2025, RTAs will be the second leading cause of disease burden and will occupy the fifth spot on the list of major killers. [1] The National Advisory of Neurological Diseases and Stroke Council defines "head injury" as a morbid condition brought on by obvious or subtle structural changes to the scalp, skull, and/or contents of the skull brought on by mechanical forces. Approximately 1.5 million people each year pass away as a consequence of road traffic accidents, according to estimates from the WHO. [2] According to the Ministry of Road Transport and Highways (MORTH), there were around 4,12,432 road accidents in India in 2021 that resulted in 1,53,792 claims of lives and 3,84,448 injuries. It is the main cause of death among young individuals of the age 18-45. [1,3,4] Road infrastructure issues, a lack of safety engineering measures, the mix of traffic, an increase in the number of motorized vehicles, unsafe driving practices, and a lack of valid licenses are some of the factors that raise the risk of road traffic accidents in India. [5,6,7,8] Road traffic accidents account for the majority of traumatic brain injuries (60%) and are followed by falls (20%–25%) and violent acts (10%).

Autopsy and Histopathology testing are the gold standards for post-mortem forensic evaluation of neuro-trauma patients. [9,10] The main benefits of autopsy include thorough examination through careful observation and exact dissection, as well as the possibility of obtaining tissue samples for further laboratory testing.

Ante-mortem radiological imaging techniques, such as a CT scan, enable indefinite imaging data storage and make it easier for second views to be obtained during legal processes. [11]

Aims and Objectives:

- To determine the severity of the issue in relation to various host variables.
- To examine the distribution of cerebral hemorrhages in road traffic accident fatalities from fatal head injuries.

Materials and Methods

A prospective study of fatal head injury patients was conducted at the Mortuary, Department of Forensic Medicine, Bundelkhand Medical College and District Hospital, Sagar, and the autopsies of these fatal head injury patients were performed.

The study was carried out after getting ethical clearance from the institutional ethical committee.

Inclusion Criteria: All fatal head injuries from motor accidents are referred to medical-legal autopsies.

Exclusion Criteria: Patients who passed away in RTAs from causes other than head injuries were not included. Cases of severe decomposition resulted in fatal head injuries and made it impossible to understand the nature of the injuries.

Sample Size: The study included 200 patients with fatal head injuries from RTAs as a convenience sample size.

Statistical Analysis: All the statistical analysis was done using. IBM SPSS statistics 26.0. Descriptive statistics of categorical data were presented as proportions for comparison.

Observation and Results: The present study of patterns in fatal head injury cases of road traffic accidents was carried out in a tertiary care center in the Bundelkhand region, Sagar. 200 cases were autopsied over a period of one year, from October 2022 to October 2023.

The Data has been systematically recorded and various observations were made and tabulated in tables.

The most susceptible age group, as shown in Figure 1**,** was between the ages of 31 and 50, followed by that between the ages of 21 and 30. They are the most socially engaged demographic in society, thus it stands to reason that they are more likely to be involved in traffic accidents.

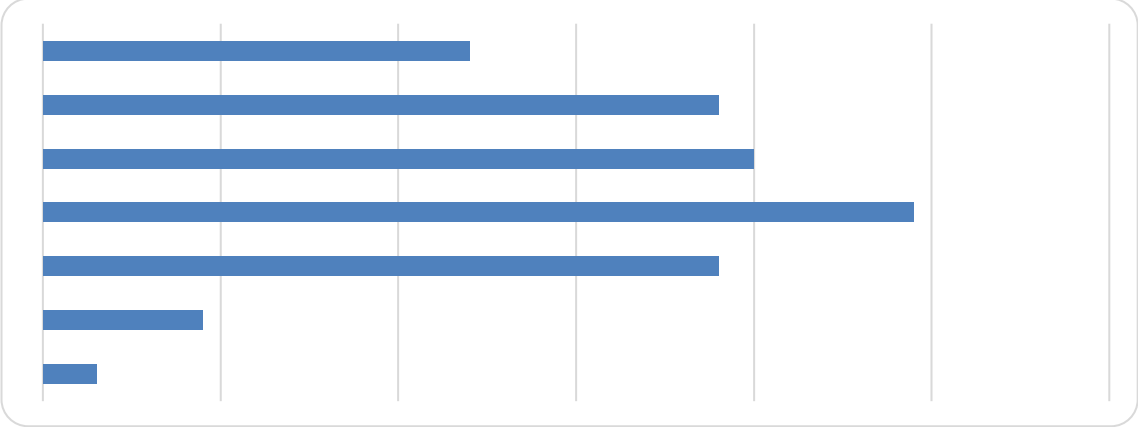

Figure 1: Age wise distribution of cases

As shown in Figure 2, (87%) were males and (13%) were females, males were more prone to head injuries in road traffic accidents. The female-to-male ratio involved in road traffic accidents is approximately 1:7.

From Figure 3, linear fractures were the most prevalent kind, accounting for 82 cases (41%); next in frequency were comminuted fractures (10 cases; 5.0%); and depressed fractures (5 instances; 2.5%).

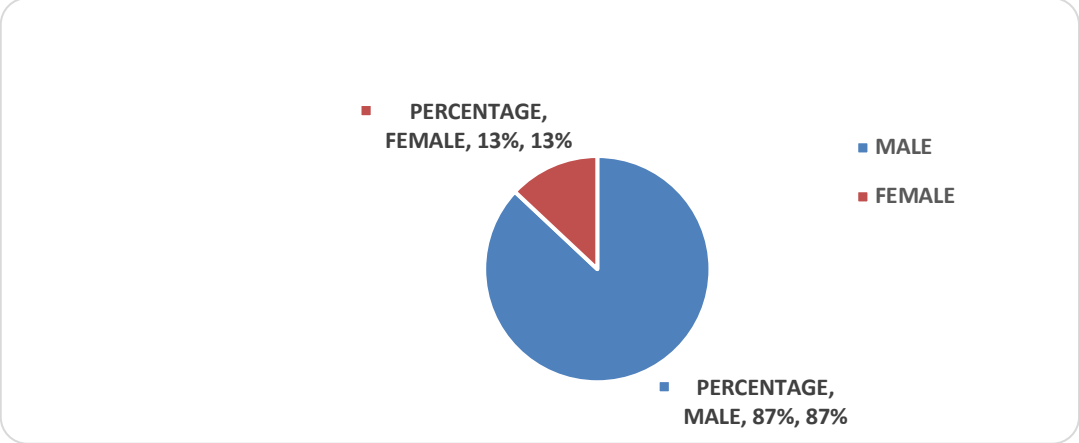

Figure 2: Sex wise Distribution of fatal RTA cases

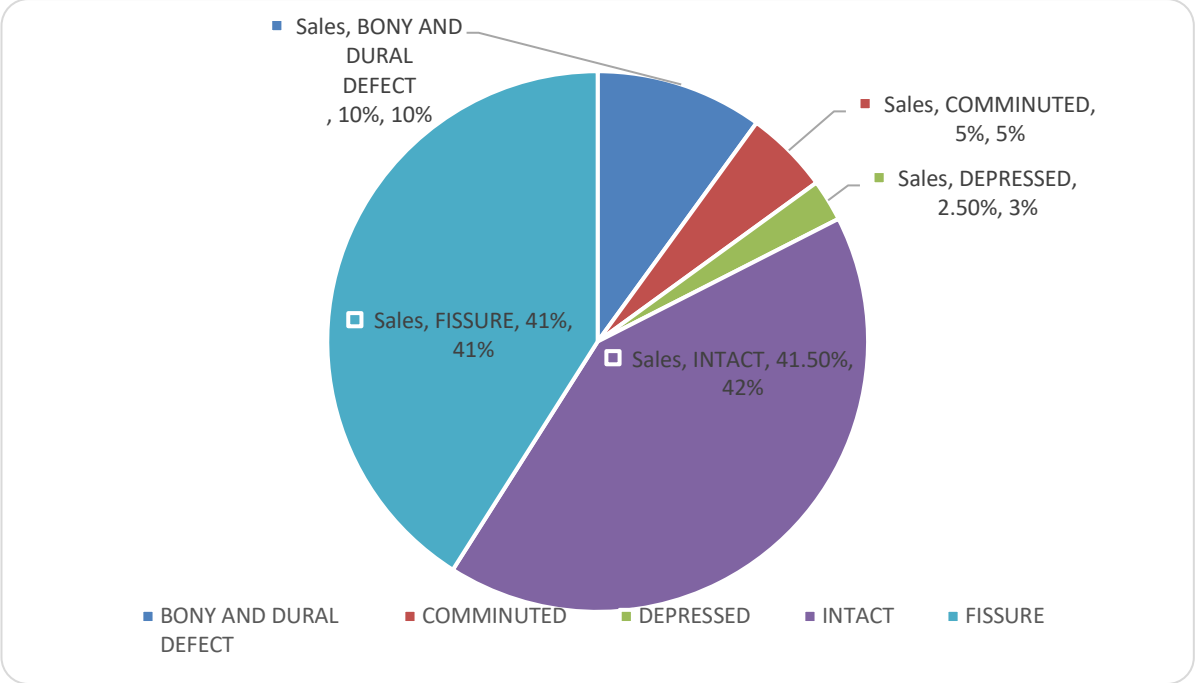

Figure 3: Distribution of different types of skull fracture

As per Figure 4, Subdural hemorrhage made up 95.5%, followed by subarachnoid hemorrhage in 86% of cases, extradural hemorrhage in 16% of cases, intra-ventricular hemorrhage in 10% of cases, intra cerebral hemorrhage in 10.5% of cases, and brain stem hemorrhage in 5% of cases.

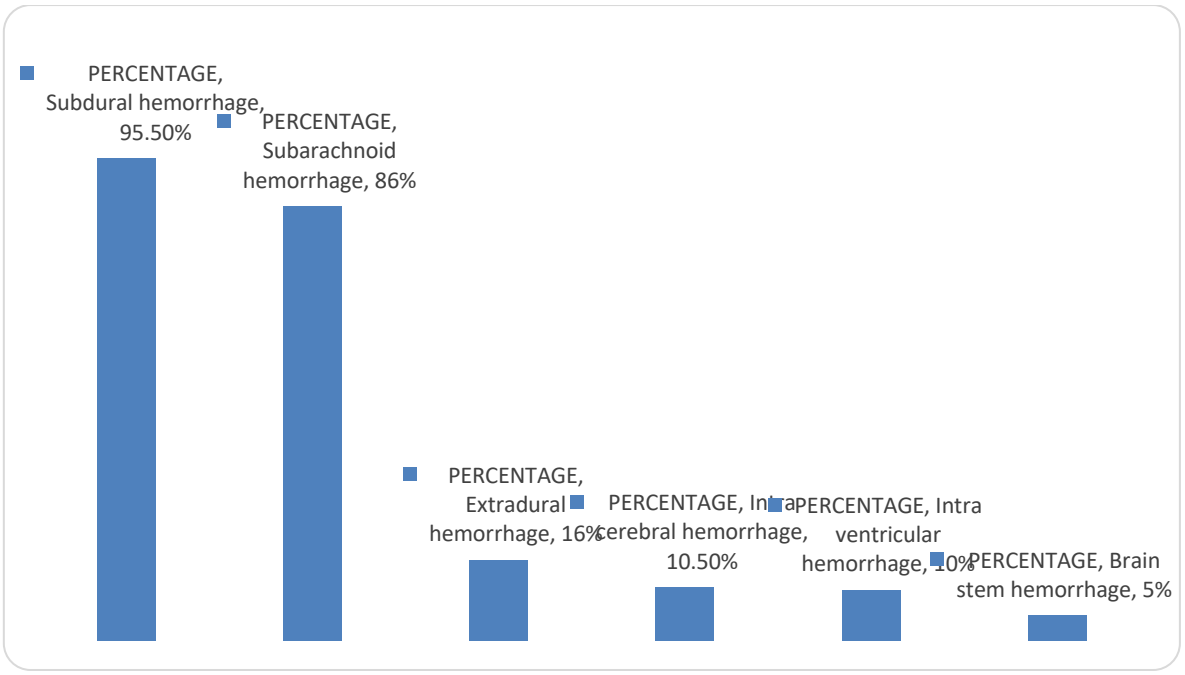

Figure: 4 Type of intracranial hemorrhages in fatal head injury cases of RTA

According to Table 1, alcohol was a contributory factor for Road Accidents in only 2% of the cases.

Table 1: Contributory Factors for Road Accidents

Contributory Factors	Frequency	Percent
Alcohol	4	2%
No	196	98%
Total	200	100.0

Discussion

The age group of 31 to 50 years old accounted for 44.5% of the most susceptible victims in our study, while the age group of 21 to 30 years old accounted for 18%, as in all previous studies. Men made up 87% of the victims in our survey, which means that they made up more than three-fourths of all the instances. In Indore research by Soni et al. [4], 85% of the victims were between the ages of 21 and 40. According to comprehensive research by Das A et al. [6], 6-48% of RTA victims who died and 2-33% of wounded had used drugs or alcohol.

However, just four victims in our investigation acknowledged drinking alcohol and this ought to be the result of incomplete reporting and data on alcohol consumption. The most prevalent form of fractures seen in the skull vault were linear fractures (82) which were followed by comminuted (10) and depressed (5) fractures and this is consistent with research conducted in Pondicherry by Kumar et al. [7], where the most prevalent form of fractures were linear fractures, followed by comminuted and depressed fractures.

The most prevalent fractures in the Bangalore research by Shobhana et al. were linear fractures, which were followed by comminuted and depressed fractures. [5] The combination of cerebral hemorrhages, fractures at the base of the skull, and fractures of the skull vault occurred in most cases of fatal head injuries. This makes sense since the fracture starts at the point of greatest impact and spreads down to the base of the skull. Subdural hemorrhage accounted for 191 occurrences of extra-axial hemorrhage in our research, with subarachnoid hemorrhage accounting for 172 cases and this was consistent with research conducted by Kumar et al. [7], 10% of cerebral hemorrhages were extradural, 58.36% were subarachnoid, and 68.13% were subdural.

In a separate research conducted in Bangalore by Shobhana et al. [5], the age range of 21 to 40 years old accounted for the majority of instances, with 89% of the victims being men. Abrasions and lacerations accounted for 25 cases each. The scalp's frontal, parietal, and temporal areas were the most often affected.

In our study, two-wheeler drivers (90 instances; 45%), pillion riders (15 cases; 7.5%), and pedestrians [85 cases (42.5%)] and this was consistent with a study conducted in Pondicherry, researchers Kumar et al. [7] discovered that two-wheeler drivers were the most susceptible category, followed by pedestrians and two-wheeler pillion riders. Just 20 cases (11%) of the patients received surgical intervention, with the majority of them receiving conservative care.

In most cases, the length of survival was shorter than one week. About 23 percent of the patients had survival duration longer than seven days. The highest number of deaths that transpired within the first twenty-four hours may be accounted for by the fact that instantly life-threatening conditions such as cerebral hemorrhages, brain contusions, brain lacerations, and brain edema might arise. In 15 cases (8%) of the fatal head injury cases death occurred on the spot similar to other studies. [12,13,14]

Conclusion

Two-wheelers were the most often reported offending vehicle type. The most frequent victims of fatal head injuries in traffic accidents were two-wheeler drivers and pedestrians, then two-wheeler pillion riders.

Apart from brain injuries, injuries to the chest, upper limbs, and lower limbs are frequently sustained in traffic accidents.

Recommendations: To record all traffic accidents nationwide, a national-level registry has to be set up. Providing information on the risk factors and epidemiological correlates of RTAs will facilitate the implementation of effective preventative measures.

To help RTA victims receive prompt interventions, healthcare facilities should be upgraded. Enough facilities for ambulances ought to be provided.

To increase the survival rate of RTA victims, standardized national criteria for their care should be created.

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