

An Autopsy Study of Skull Fractures in Association with Cranial Haemorrhages in Road Traffic Accidents

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Abstract

Background: Road Traffic Accidents (RTAs) is a leading cause of mortality in medico-legal practice where in majority of blunt trauma to head is due to RTAs, with skull fractures leading to cranial hemorrhages causing deaths.

Objectives: The objectives are to study the various patterns of skull fractures commonly associate with RTAs and associated intracranial injuries.

Materials and Methods: Secondary data study was conducted in the Forensic Medicine department of a tertiary teaching hospital of Raichur from January to December 2025. The data was collected from autopsy reports of the RTA cases, data was interpreted and systematized into bars, charts and graphs.

Results: Majority of victims were males of the age group of 21 to 30 years. Two-wheeler motor Vehicle used commonly involved. Combination of SAH and SDH commonly caused death. Non-compliance towards

the traffic rules like not using helmet, over speeding and usage of cell phones while riding and the condition of the roads also have contributed to the fatalities.

Conclusion: This study highlights towards the types of skull fractures which is being more common type and its association with cerebral hemorrhages.

It also emphasizes on preventive strategies to curb the deaths due to RTAs.

Keywords: Rtas, Skull Fractures, Cranial Haemorrhages.

Introduction

Road traffic accidents (RTAs) remain one of the leading causes of morbidity and mortality worldwide and are increasingly recognized as a major public health concern. According to the World Health Organization (WHO) Global Status Report on Road Safety (2023), road traffic injuries account for approximately 1.19 million deaths annually,¹. India alone contributes nearly 11% of global RTA-related deaths, with over 150,000 fatalities recorded annually². The World Health Organization (WHO) predicts that by 2030, RTA will rank as the fifth most common cause of death globally.³ ⁴ Head injuries are particularly significant among RTAs due to their direct correlation with mortality and morbidity.

The anatomical position of head makes it highly vulnerable compared to other body parts in RTAs along with bio mechanical forces disseminated during RTAs. Fractures, intracranial hemorrhages and brain injuries as a result of primary force of collision is absorbed by skull.⁵

Site of skull fracture gives an approximate idea towards the series of events and injury mechanism.⁶ Autopsy remains the gold standard for establishing precise injury patterns in dead.⁷

Head injuries due to RTAs are significantly alarming as majority of victims belong to the mean age of productive population.^{8,9}

Materials and Methods

Source of data: All RTA deaths from January to December 2025 autopsied in Department of Forensic Medicine and toxicology of Raichur Institute of Medical Sciences (RIMS), Raichur.

Study Design: Secondary data analysis.

Method of Collection of Data: Present study was conducted in the department of Forensic Medicine and Toxicology of a tertiary teaching centre, Raichur from January 2025 to December 2025. Data was collected from all cases of RTA where in head injury was present autopsied at this centre. Every detail was recorded in a standardised proforma designed for this study. Further data was analysed and tabulated in graphs, bars and charts.

Inclusion Criteria: All RTA cases with head injury.

Exclusion Criteria

- Decomposed and mutilated bodies where cause of death cannot be established.
- All head injury cases where cause is not RTA.

Operational definitions

1. RTA: A traffic accident, also known as a road traffic collision (RTC), is an unexpected event that occurs on a road involving at least one vehicle, leading to damage to property, injuries, or loss of life. These accidents can involve various factors such as human error, vehicle malfunctions, adverse weather conditions, and road infrastructure deficiencies.¹⁰

2. Cranial Haemorrhage: Cranial haemorrhage also called Intracranial haemorrhage refers to any bleeding within the intracranial vault, including the brain parenchyma and surrounding meningeal spaces.¹¹

3. Sub – Arachnoid Haemorrhage (SAH): A subarachnoid haemorrhage is bleeding in the space between the brain and the tissues that cover the brain. The space is known as the subarachnoid space¹²

4. Sub-Dural Haemorrhage: An acute subdural hematoma (SDH) is a clot of blood that develops between the surface of the brain and the Dura mater, the brain's tough outer covering, usually due to stretching and tearing of veins on the brain's surface. These veins rupture when a head injury suddenly jolts or shakes the brain.¹³

5. Extra-Dural haemorrhage: Epidural hematoma (EDH) is an acute, life-threatening accumulation of blood between the dura mater and the inner table of the skull, most often resulting from blunt head trauma.¹⁴

6. Ethical Clearance: Ethical clearance deemed as study is based on secondary data

Results

Among 103 RTA cases that were autopsied from January to December 2025, 59 (57%) cases were with skull fractures associated with cranial hemorrhages. Of 59cases, 43 (73%) cases were males and 16 (27%) cases were females [Fig.1],.AS per age group, 21 to 30 years (22%) age group (13 cases) was the most vulnerable age group followed by 31 to 40 years (10%)age group (6 cases) [Fig.2].

Commonest vehicle involved was two wheeler motor vehicle accounting to 42 cases (72%) followed by bicycle accounting to 08 cases (14%) and least being four wheeler accounts to 3 cases (5%) [Fig.3].

Of the 59 cases fissure fracture was the commonest amounting to 25 cases (42%) and 5 cases (8%) of hinge fractures being the common fracture found [Fig.4]. Among Intracranial hemorrhages, combination of SAH and SDH haemorrhage (SAH) and Sub - Dural

haemorrhage was most common cause of death contributing to 38 cases (64%) and 2 cases (3%) of EDH being the least common cause of death[Fig.5].

Figure 1:

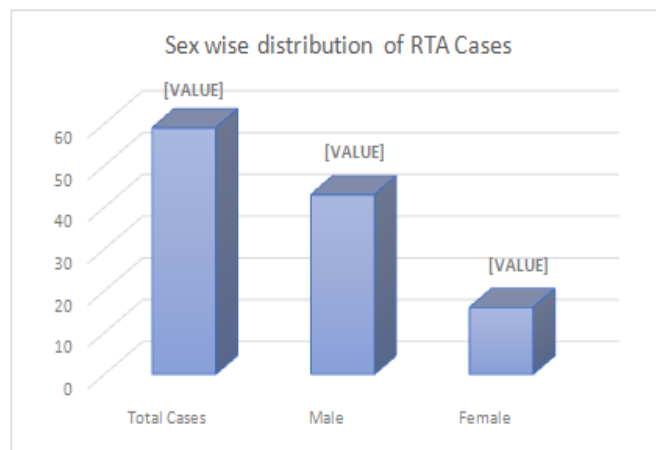


Figure 2:

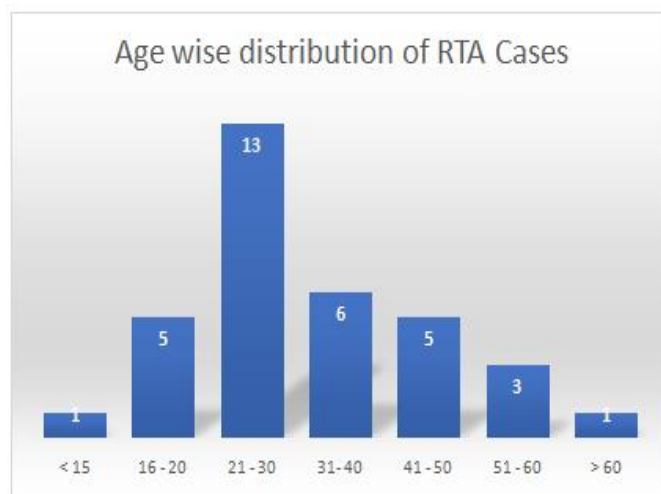


Figure 3:

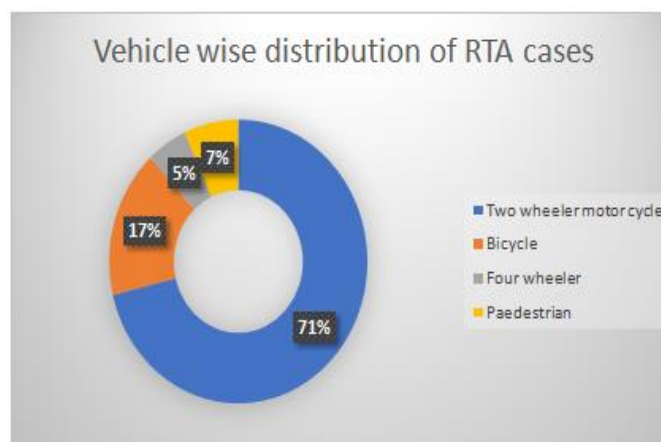


Figure 4:

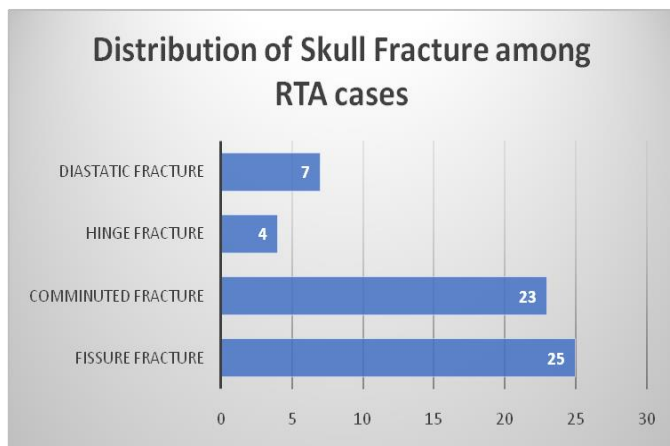
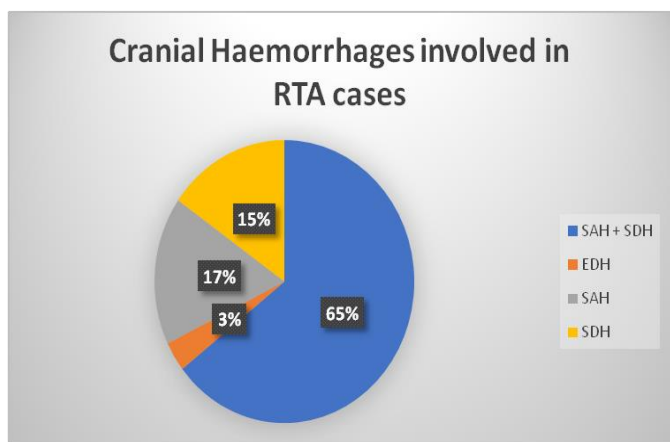


Figure 5:



Discussion

The present study was conducted at our centre to study the prevalence of RTAs associated with common type of skull fracture and its association with or without cranial injuries. This study also emphasizes on the risk factors, type of vehicle used and preventive measures. RTAs have evolved in recent decades as massive health problem worldwide.

In this study males form majority of the deceased (73%) in accordance with study by Zameeruddin Ahmed Hashmi et al¹⁵ and Abuzar Rizwi¹⁶. This study says majority of deceased belonged to 21-30 years (22%) in similarity with study done by Rizwi¹⁶ and Nabajit B et al¹⁷. Two wheeler was most common vehicle involved (72%) as per this study alike study by Prabha karan SP

et al^{18]} and Abuzar Rizwi¹⁶. Our study reveals that fissure fracture (42%) was most prevalent consistent with study conducted by Parvathy J et al¹⁹ and V Rajshekhar, G Dinesh²⁰. In our study Intracranial lesion death causing death was combination of SAH and SDH (64%) where as in study carried out by Nabajit B et al¹⁷, the commonest intra cranial lesion causing death was SDH¹⁷ and one of the study by Reena A²¹ disclosed that SAH was the commonest intracranial lesion causing death.

Recommendations: Deaths due to head injuries secondary to RTAs is alarmingly increasing involving younger productive age group of the population leading to substantial agony and pain to various families and also affecting the GDP of the country. So it calls for the safety measures especially for male riders where in head is the commonly involved part of body to follow the safety measures like using Helmets, maintaining speed limits, no stunts while riding influenced by media and western world and adhering to Road Traffic Rules and maintaining of road standards by authorities and Road safety rules awareness campaigns which can curb this Agonising Uneventful situation. Since most affected are young productive population, it becomes urgent public issue which need to be addressed.

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