

## **REVIEW ARTICLE**

### **A Comprehensive Review of Epidemiological Findings in Craniofacial Trauma Patients with Head Injuries**

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#### **ABSTRACT**

**Background:** Craniofacial trauma patients with concomitant head injuries present a significant challenge in tertiary care hospital settings. Understanding the epidemiological patterns and outcomes of such cases is crucial for optimizing management strategies and improving patient care. **Objective:** This systematic review aims to analyze the epidemiological characteristics and clinical outcomes of craniofacial trauma patients with head injuries treated in tertiary care hospital settings. **Methods:** A comprehensive search was conducted across major databases including PubMed, Embase, and Google Scholar for relevant studies. Studies reporting epidemiological data and clinical outcomes of craniofacial trauma patients with head injuries in tertiary care hospitals were included. Data extraction and synthesis were performed following PRISMA guidelines. **Results:** A total of 20 studies met the inclusion criteria, comprising a diverse range of craniofacial trauma cases with associated head injuries. The majority of patients were male (range: 60%-85%) with a mean age ranging from 20 to 40 years. Road traffic accidents (RTA) were the leading cause of injury, followed by falls and assaults. Fractures of the mandible and maxilla were the most common craniofacial injuries observed. **Conclusion:** This systematic review of understanding these patterns can aid healthcare providers in devising comprehensive management strategies to improve patient care and outcomes in this complex patient population. Further research is warranted to explore advancements in treatment modalities and long-term prognostic factors for better patient management.

**Keywords:** Head Injury, Craniofacial, Trauma, Hemorrhage, RTA.

#### **Introduction**

The craniofacial complex is made up of basic tissues including blood vessels and nerves as well as a range of specialized tissues such as craniofacial bones, cartilage, muscles, ligaments, and the highly specialized and distinctive organs, the teeth.<sup>1</sup> The craniofacial (Skull) comprises two structures i.e., cranium and facial bones. Cranium bones are 8 in number.<sup>2</sup> The eight cranial bones are named Frontal bone, Parietal Bone, Temporal Bone, Occipital Bone, Sphenoid Bone, and Ethmoid Bone<sup>3</sup>. The fourteen facial bones are named paired nasal bones, inferior nasal conchae, palatine bones, maxilla, zygomatic, lacrimal, unpaired vomer, and the mandible or lower jaw<sup>4</sup>.

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**Objectives**

The Present study has the following objectives;

1. To study the availability of health services in CHCs and PHCs in the study area.
2. To study the availability of manpower in CHCs and PHCs in the study area.

To study the gap between requirement and existing health services and

Craniofacial trauma can link with many injuries to the chest, head, spine, abdomen, pelvis as well as extremities. Severe brain injury can be caused by force transmitted to ward the brain and neurocranium.<sup>5</sup> A serious injury due to sudden and vigorous external force over the body is considered trauma. Traumas can be recoverable as well as unrecoverable in workplaces, and homes, Road Traffic Accidents (RTA), violence, falls, outdoors, sports, and foreign material penetration are the major reasons for skull trauma, and cranium trauma can also affect the facial bones.<sup>6</sup> Craniofacial injuries due to RTA are hard to manage, but proper management and planning of facial injury patterns can help in diagnosis as well as in treatment.<sup>7</sup>

In India, the death rate because of accidents is approx. 13-15 people per hour. In 2011, several deaths were 1,42,458, and in 2018 it was 4,67,044 due to a Road Traffic Accident. There is an assumption that in the future i.e. till 2024. The RTA death rate will be 2/10,000 people in developing nations and <1/10,000 people in developed nations. It has been seen in major RTA sites victims sought out the matter by mutual conversation and did not report injuries which caused a lack of reporting RTA. For prevention and planning to deal with RTA. There should be enough information on the victim's character, reason and kind of mishap, the seriousness of the injury, the kind of vehicles as well as the speed and direction of vehicles.<sup>8</sup>

There were-scooter-related trauma, craniofacial trauma as well as dental injuries in which observe that 206 patients, 188 patients (92.6%), and 25 patients (12.3%) simultaneously. Most of the cases happen due to rules and protocol breaks like riding bikes without helmets. Head and face are involved in 75% of traumatic injuries. The skull is one of the sensitive regions of the body which frequently in traumatic conditions. Frequent trauma of the skull can be blunt or penetrating trauma. As the head is a crucial part of the body, so there is a high chance of complexity of bone fractures or nerve pinching. Imaging techniques like X-rays and Computed Tomography (CT) are useful for the assessment of the anatomical structure. Intracranial hemorrhages and temporal bone fractures are not captured easily and are missed unintentionally. Information regarding craniofacial trauma health status is helpful for specialists to understand its type as craniofacial trauma is most frequent in emergency and forensic departments.<sup>9</sup>

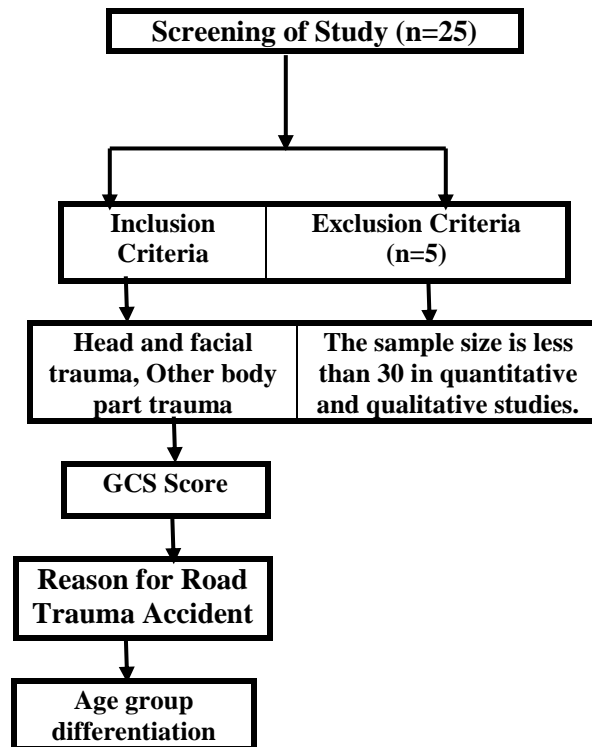
It is crucial to analyze the epidemiology of roadside trauma patients given the rising frequency of death to reduce trauma-related morbidity and mortality.<sup>8</sup> In this qualitative review-based study, the author's objective is to know the percentage of head-face trauma, its effect on other body parts like the thorax, abdomen, and pelvic region, the most frequent fracture, Glasgow Coma Scale (GCS) score indication of trauma seriousness, and common accident reason. All the mentioned points help us understand the facts related to Road Traffic Accidents (RTAs).

**Methodology**

The data were extracted from Scopus, Research Gate, PubMed, and Google Scholar. 20 number of articles were selected for the study for review and some of them are mentioned here.

**Inclusion Criteria**

1. Reference quantitative observational study should have more than 30 patients.
2. Reference review-based study should have more than 10 studies.



**Result**

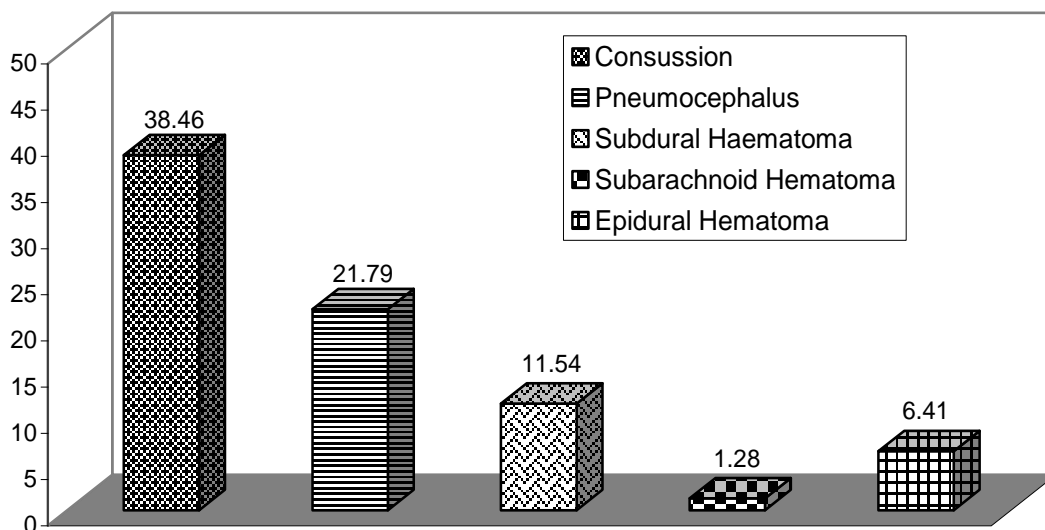
**Craniofacial Injuries:** Out of 20 studies, almost every study stated about cranium trauma. One of the studies considered 2466 patients. Out of 2466 patients, 1000 patients reported cranium (head) trauma which included cerebral contusion, intracranial blood clot with swelling (hematoma), skull Fracture, and Dural hematoma. The patient % for head trauma was 40.5%.

A study observed craniofacial injuries happen due to falling, occupational, and sports injuries. Bleed, fractures majorly happen in RTA’s but in the face, craniofacial trauma is frequent. One of the studies of the observed head and facial injuries was evident in 68 patients (80%) of male gender out of 85 male’s gender. There 51 (86%) show evidence of facial trauma in the age group between 15-30 years.

A study result reflects the observation, that there were 100 patients out of which 91 patients met with RTA and 63 patients had suffered from cranium trauma. Concussion, pneumocephalus, and hematoma which include subdural, subarachnoid, and epidural are the different kinds of cranial trauma that have 38.46%, 21.79% 11.54% 1.28%, and 6.41% simultaneously. Facial bones are also affected by these traumas and the mandible has 26.9% of injury type.

**Other body parts Thorax, Spine, Abdomen & Pelvic:** A study revealed that thorax abdomen and pelvis injuries were reported 546 by 2650. In the thorax region, pneumopericardium, Injury reports death reason whereas in the abdomen organ laceration reports death. No death is reported in pelvic injury. Spine, as well as abdominal trauma, is also absorbed.

Figure-1: Types of Craniofacial Injuries



Body Part	No. of injured	%
Head	1000	40.5
Thorax, abdomen pelvis	546	20.6
Extremities	480	19.4

**Fractures:** One of the following studies stated and observed 206 cases of cranial fractures Out of 416 fractures which is 49.5%. Linear fracture type is most frequent which 88.9% was and spider fracture type is very minimal which was about 0.5%. A study observed brain injury as intracranial hemorrhage in 273 patients (65.6%), cerebral contusion in 113 patients (27.1%), and concussion in 273 patients (66.3%). Intracranial bleeding was frequently observed in 80 patients (29%).

**Glasgow Coma Scale (GCS):** Few of the studies stated observed GCS scores indicate mild, moderate, and severity of cranial trauma which was 12 to 15, 10 to 12, and 6 to 9 simultaneously.<sup>10</sup> One of the studies stated there were a hundred patients out of which 91 patients met with RTA. Out of 91, Sixty-three patients had had trauma, categories were divided into groups, based on GCS score. 9 patients were considered under serious condition, Obtained scores between 3-8. 37 patients were considered under moderate conditions, and obtained scores between 9-12 whereas 21 patients were considered under mild conditions and obtained scores between 13-15 score.

One more quantitative study revealed the same; categorize the seriousness of the injury the GCS scale was applied, which categorized as mild cranial trauma in 319 patients (76.7%), Moderate cranial drama in 50 patients (12%), and severe cranial trauma 47 patients (11.3%). The blunt type & penetrating types of injuries were there which was 98.8% and 1.2% simultaneously.

**Common Accidental Reason:** The most frequent cause of injury observed is the history of falls which were in 37 patients (32.9%), motorcycle accidents in 86 patients (20.7%), motor vehicle accidents involving pedestrians in 79 patients (19%), and others in 60 patients (14.4%). One of the following studies to put the swim on motorcycle injured was observed 150 patients (74.3%) As compared to non-motor vehicle injured patients observed 126 patients (58.9%). The study revealed two-wheeler accidents and car accidents are common that is 1037patients (42%) and 865patients (35%) whereas gunshots and falling from vehicles like trains and buses were rare that is 11 patients (0.4%), 21patients (0.8%) and 43patients (1.7%) simultaneously.

**Age Factor:** One of the studies took 2466 patients and revealed age group of 14 to 40 years was mostly included in RTA. One of the studies states the same, the 20-30-year age group for frequently included in RTA whereas more than 60 years of age includes 5% only. A study stated out of 100 patients, 91 patients (91%) male were injured, and dressed were female 9 patients (9%). The age group between 10-30 years showed a high percentage of accidents in which males were 31 (62%) and 19 (38%) females.

## Discussion

Male communities are frequently captured in road traffic accidents (RTA) as discussed in studies. A major reason for RTA is rash driving, negligence while on the road, and disobeying traffic protocols. Alcohol intake as well as impoverished vehicles or automobiles. Craniofacial drama can happen with people who climb on trees and violence as well. Facial injuries like zygomatic, orbit, nasal, mandibles, maxilla rupture, and fracture are common. In skull fractures, intracranial hematoma, contusion, and scalp laceration, surgical intervention takes place. Internal fixation, mini plates, and repositioning are used for the management of craniofacial trauma 2% is the mortality rate. Craniofacial injuries have happened due to falling, occupational, and sports injuries. Bleeds, and fractures majorly happen in RTA's but craniofacial trauma is frequent.<sup>7</sup>

According to a study stated at 934 (37.4%) victims were recorded within 6-12 hours which is frequent for 2466 people. The least 29 (1.17%) victims recorded within an hour. A frequent reason for mishaps war rash driving without seat belts 402 (16.3%) Whereas with seat belts were less that is about 241 people (9.5%) cars and two-wheelers simultaneously. Alcohol consumption is one of the leading causes of RTA which was reported 239 (9.6%) and 273 people (11.0%) for car and bike simultaneously.

Gender	No. of injured	%
Male	2251	91.32
Female	215	8.71

Alcohol intoxication significantly complicates the assessment of consciousness levels in patients with head injuries. When the level of alcohol intoxication is sufficient to impair their Glasgow Coma Scale (GCS), it is advisable to conduct a Computed Tomography (CT) scan. High-velocity impact can cause rupture of intracranial vessels, leading to life-threatening intracranial haemorrhages, in addition to maxillofacial fractures. One of the studies also agreed that unconsciousness, decrease in GCS, and amnesia are good indications for intracranial trauma but Traumatic Brain Injury (TBI) can easily be predicted without these indicators in victims with cranial facial trauma<sup>(11)(12)</sup>.

## Conclusion

This review article concluded that accidents or RTA frequently affect cranium and facial injuries. 20-40 years are injured in it. Reckless driving and ignoring protocols are some of the frequent reasons for trauma. As the GCS decreases, the risk of head injury increases. Fractures and dislocation are frequent as well and hematoma is the reason for mortality. To rule out trauma, radiological examinations like X-rays, CTs, and Magnetic resonance imaging (MRIs) are useful for diagnosis as well as treatment purposes.

**Conflict of interest:** No

**Authors & contributions:** SKC1, VJ2, HKS3, and YC4 were involved in the concept and design of research, literature search, and data acquisition. Manuscript editing and finalization was done by SKC1, VJ2 & YC4

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