

## Clinico-Etiological Profile and Short Term Outcomes in Pediatric Head Injury Cases: Our Institutional Experience

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### ABSTRACT

**Introduction:** In developing countries like India, the incidence of TBI is very high. The pathophysiology, clinical presentations and management are different as compared to adults. Hence the need to have a focused study to evaluate etiology and outcomes in Pediatric traumatic head injury.

**Material and Method:** We retrospectively studied 45 cases of pediatric traumatic head injury upto age 14 years presenting to our institute. The study period was of 1 year from June 2022 to June 2023. Demographic data and clinical features were noted and severity was assessed by GCS scale on admission. CT scan was done in all cases.

**Result:** The number of males were 62.2% while 37.7% were females. The mean age of presentation was 5.7 years. The most common etiology in our study was fall (64%) followed by RTA (24%) and sports and others constituting the least (7%). The most common presenting feature was headache (66.6%), vomiting (63.4%) followed by seizures (26.4%) and loss of consciousness (6%). On basis of GCS, 90% cases were mild in severity and 8% moderate and 2% severe. CT was normal in 32% cases and abnormal in 68% cases with Fractures being more common finding. The short term outcome was good in 95.6% and 4.4% had neurodeficit. Anti convulsants were prescribed to 26% case.

**Conclusion:** There is a urgent need to have studies focused on pediatric head injury cases. In present study we try to contribute to the current literature available in Indian settings. We also want to increase awareness about preventable cases as most of the head injury cases can be avoided by vigilance and care by the parents.

**Keywords:** Pediatric; Traumatic Head Injury; Computed Tomography.

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### INTRODUCTION

Traumatic brain injury (TBI) is the leading cause of death and disability in children. A large amount of data has emerged from studies by the U.S. Centers for Disease Prevention and Control regarding pediatric TBI. An estimated 475,000 people in U.S. in the age group of 0-14 years sustain TBI annually, of which up to 90% return home with mild injuries, 37,000 are hospitalized, and 2,685 die because of their injuries.<sup>1</sup>

In developing countries like India, the incidence of TBI is very high and is comparable to many common infectious diseases. The number of hospitalizations for TBI is significant and is estimated to be around 75 to 80 per 100000 in developed countries. This number being much higher in developing countries.<sup>2</sup>

TBI in children result in a range of traumatic injuries to the scalp, skull, and brain. In general, primary TBI includes extra parenchymal injury (epidural hema toma, subdural hematoma, subarachnoid hemorrhage, and intraventricular hemorrhage), intra-parenchymal injury (intra-cerebral hemorrhage, diffuse axonal injury [DAI], and intracerebral hematoma) and vascular injury such as vascular dissection, carotid artery cavernous sinus fistula, dural arteriovenous fistula, and pseudo-aneurysm.<sup>3,4</sup>

The pathophysiology, clinical presentations and management are different as compared to adults. Hence the need to have a focused study to evaluate etiology and outcomes in Pediatric traumatic head injury.

In this study we retrospectively examined 45 cases of Pediatric traumatic head injury for etiology, severity on presentation and the short term outcome.

## MATERIAL AND METHODS

We retrospectively studied 45 cases of pediatric traumatic head injury upto age 14 years presenting to our institute. The study period was of 1 year from June 2022 to June 2023.

### Inclusion Criteria

All children upto 14 years who presented to casualty with clinical features of head injury or alleged history of head injury.

### Exclusion Criteria

1. Cases with polytrauma.
2. Cases which required ventilation and radiological imaging was not possible.
3. Those not giving consent to be included in study.

History was noted in detail for all the included case. For demography data age, gender, injury type, place, cause and presenting clinical features were noted. The examination findings were noted on admission and over the course in hospital. GCS scale was used to assess the severity of head injury.

According to GCS, the cases were classified into

three groups:

1. Mild (GCS 13-15)
2. Moderate (GCS 9-12)
3. Severe (GCS 3-11)

Basic workup was sent in all cases. CT brain was done in all cases. Radiological findings were noted which included features like fractures, epidural or subdural bleed/subarachnoid bleed, intra carebral bleed, mass lesions, midline shift, diffuse axonal injury etc. The cases were managed appropriately according to the NICE guidelines and short term outcome on discharge from hospital was noted.

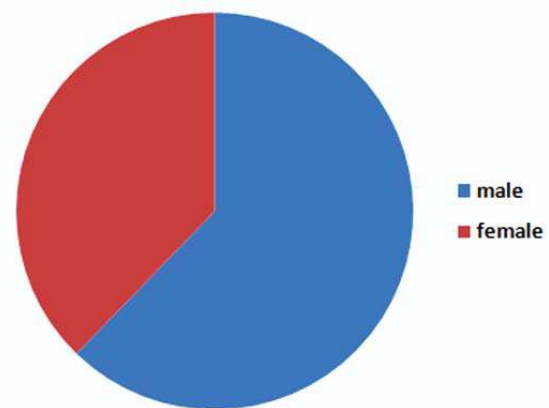
Descriptive analytical formulae were used to calculate the mean and range for an even distribution, or median and interquartile range for an unven distribution.

## RESULTS

### 1. Demography

Total 45 patients were taken in our study. Male were 62.2% (n=28) and female were 37.7% (n=17).

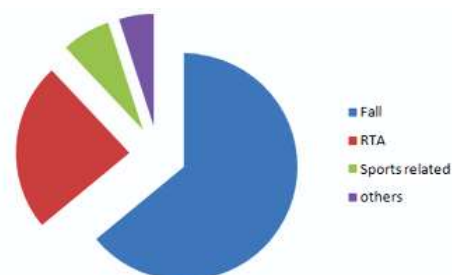
The mean age of children was 5.7 year with age ranging from 6 month to 14 years.



Gender distribution

### 2. Etiology of Traumatic Brain Injury

The most common etiology was fall from height 64% (n=28) followed by RTA 24% (n=11) and sports related injuries 7 % (n=6).



3. Clinical features were local pain over scalp (30/45), headache (29/45), vomiting (28/45) followed by seizures (12/45) and loss of consciousness (3/45).

Local swelling/pain	66.6%
Headache	63.4%
Vomiting	62%
Seizures	26.4%
Loss of consciousness	6%

4. *Severity on Presentation Based on GCS:* Mild 90% (n=40), Moderate 8% (n=4) and Severe 2% (n= 1).
5. *CT Imaging:* CT scan was abnormal in 68% cases with findings including fracture, scalp injury/oedema, followed by extra axial bleed.
6. *Short Term Outcome:* All the cases were managed according to NICE guidelines. Patients were conservatively managed in most cases. 43/45 cases were managed conservatively. They were managed by 48 hour observation and symptomatically managed. Anti convulsants were prescribed in 26% (n=12). 1 case was operated for extra dural bleed. 1 case with bleed in right basal ganglia had features of raised intracranial pressure and needed decompression craniotomy. The short term outcome was very good in our study. The average days of stay was 3 days. 95.6% cases were completely asymptomatic on discharge. 2 cases had neurodeficit in form of hemiparesis.

## DISCUSSION

Traumatic brain injury is a significant cause of death and disability in children and young adults all over the world.<sup>5</sup> Although traumatic brain injury is gaining epidemic proportions, the pathophysiology, clinical symptoms, and outcomes after traumatic brain injury are still not completely understood. The pathophysiology, the mechanisms of injury differ in children as compared to adults. In contrast to adult data on traumatic head injury, there is limited data in pediatric trauma especially from India.

The proportion of males compared to female was significantly higher in our study with male constituting 62.2%. Similar finding was seen in study by Thursman<sup>6</sup> in which there was a male-to-female ratio of 1.4 and 2.2 in the 10-year age group,

respectively.

The average age of presentation in our study was 5.7 year. In a Indian study by Nadkarni *et al.*<sup>7</sup> which included 269 cases, mean age of presentation was 4.7 years.

The most etiology in our study was fall followed by RTA and sports related injuries. Sharma *et al.*<sup>8</sup> found that the most common pediatric age group predisposed to trauma was 6-12 years with the most common type of injury being orthopedic injury (37.8%) followed by head injury (24.3%). The most common mode of injury was fall from height (39.4%).

The most common clinical presentation was headache in our study. In some studies, loss of consciousness was the most common presentation which differs from our study.

Present study found that 90% patients incurred Mild TBI while in some indian studies mild cases constituted 65.3% in study by Kuppermann N *et al.*<sup>10</sup>, 68.7% in a study by Satapathy M *et al.*<sup>9</sup>, and 70% in a study by Gururaj G *et al.*<sup>11</sup>

In our study CT showed positive findings in 68% cases and most common finding was fractures. This was comparable to study by Osmond M *et al.*<sup>12,14</sup> which showed skull fracture is the most common injury followed by contusions and extradural hemorrhage in CT scan.

The short term outcome in our case was very good with 95.6% cases being asymptomatic and stable on discharged. There are not many studies available on outcomes in pediatric traumatic head injury but a study by Chaitanya *et al.*<sup>13</sup> showed none of the child had neurocognitive impairment while being discharged from the hospital or while being at follow-up till 6 months.

## CONCLUSION

The incidence of Pediatric head injuries forms a significant burden on economic and health care system in our country. The pathophysiology as well as management in pediatric cases differs as compared to adults. Hence there is a urgent need to have studies focused on pediatric cases. In present study we try to contribute to the current literature available in Indian settings. We also want to increase awareness about preventable cases as most of the head injury cases can be avoided by vigilance and care by the parents.

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