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*Original Research Article*

# Computed tomography in patients with craniocerebral injury: Descriptive clinical profile

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## Abstract

Immediate and instantaneous death following cranial trauma occurs due to unpreventable primary brain injuries. However, death occurring within 24hrs of craniocerebral trauma can be averted by timely institution of diagnostic and therapeutic measures that could prevent secondary brain insults. A complete clinical history of the patients was noted on proforma, which included, age sex, type of injury, principal presenting complaints. The type of trauma was further classified into Road traffic accidents, fall, Assaults, industrial accidents and miscellaneous. Follow up of Patients during their hospital stay was performed. According to the study, commonest type of fractures associated with head injury were linear fractures accounting for 67(72.04%), followed by depressed fractures 18(19.35%) and sku11 base fractures 8(8.61%).

**Keywords:** Computed tomography, craniocerebral injury, depressed fractures

## Introduction

Accidents are the leading cause of death or disability in men under the age of 35years. Over 70% of accidents are associated with head injury. Craniocerebral trauma causes a spectrum of brain injuries ranging from transient physiological dysfunction, manifested by sho11period s of confusion and amnesia to severe immediate irreversible neuronal damage and death. Most of these patients are in their prime 2nd and 3rd decade of life and therefore have a direct social and economic effect besides the emotional burden of suffering a lifelong debilitating loss of function [1].

Almost 100% of persons with severe craniocerebral injury and as many as two-thirds of those with moderate craniocerebral injury will be permanently disabled and will not return to their premorbid level of function [2].

Immediate and instantaneous death following cranial trauma occurs due to unpreventable primary brain injuries. However, death occurring within 24hrs of craniocerebral trauma can be averted by timely institution of diagnostic and therapeutic measures that could prevent

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secondary brain insults [3].
Prompt recognition of treatable injuries is critical to reduce mortality and CT of the head is the cornerstone for rapid diagnosis. Follow up assessment using CT is frequently necessary to detect progression and stability of lesions and evidence of delayed complications and sequel of cerebral injury, which can determine whether surgical intervention is necessary [4].

## Methodology

### Source of data

The present study was carried out in patients with craniocerebral injury, referred to Teaching and General Hospital, in the Department of Radio-diagnosis.

### Sample size

The study comprised a total of one hundred and fifty patients (150) with head injury admitted to Teaching and General Hospital.

### Inclusion criteria

1. Patients of all age groups with craniocerebral injury.
2. Craniocerebral injury that has occurred within 24 hours.
3. Glasgow coma scale < 14.
4. Patients with craniocerebral injury treated as in-patients.

### Exclusion criteria

1. Patients with craniocerebral trauma with no positive CT findings
2. Cranial trauma during childbirth.
3. Glasgow coma scale >14.
4. Patients with non-traumatic intracranial bleed.
5. Patients who cannot be followed up.

### Plan of study

A complete clinical history of the patients was noted on proforma, which included, age sex, type of injury, principal presenting complaints. The type of trauma was further classified into Road traffic accidents, fall, Assaults, industrial accidents and miscellaneous. Follow up of Patients during their hospital stay was performed.
After initial resuscitation, severity of the craniocerebral injury was graded with the help of "Glasgow Coma Scale" (GCS).
After the examination of the cervical spine for any evidence of injury, the patients were examined with CT scanner in the supine position. The Gantry tilt was given in the range of ± 0-20 degrees, so as to parallel the scan plane to the orbito-meatal line.
Contiguous axial sections of slice thickness 5 mm were taken for the posterior fossa study and l0 mm in the supratentorial region respectively. Thinner sections were also obtained in the region of interest.
Bone algorithms & wide window settings were studied to visualise the various craniocerebral changes.

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## Results

A total of one hundred and fifty patients of craniocerebral injury with positive findings on CT scan were included in the present study.

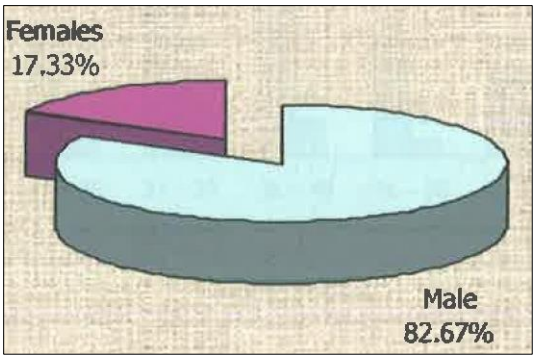


**Fig 1:** Sex wise Distribution in craniocerebral injury

Male population dominated the study with 82.60% of patients being male and 17.3% being female.

**Table 1:** Age Distribution

| Age group | Male | | Female | | |
|---|---|---|---|---|---|
| | No. | Percent | No. | Percent | Total |
| 0 - 10 | 14 | ll.29 | 4 | 15.39 | 18 |
| 11-20 | 15 | 12.09 | 2 | 7.69 | 17 |
| 21 -30 | 40 | 32.26 | 10 | 38.46 | 50 |
| 31-40 | 28 | 22.58 | 4 | 15. 39 | 32 |
| 41-50 | 13 | 10.48 | 2 | 7.69 | 15 |
| 51 -60 | 10 | 8.07 | 2 | 7.69 | 12 |
| >61 | 4 | 3.23 | 2 | 7.69 | 6 |
| Total | 124 | 100 | 26 | 100 | 150 |

In the present study, the peak incidence of head injury in males occurred in the age group of 21-30 i.e. 40 patients (32.26%).Incidence in other age groups being 14 patients (11.29%) in 0-10, 15 (12.09%) in 11-20,28 (22.58%) in 31-40, 13 (10.48%) in 41-50, 10 (8.07%) in 51-60 and 04 in (03.23%) patients aged above 61.
In females also the peak incidence occurred in 21-30 age group i.e. 10 patients (38.46%).The other age groups being 04 (15.39%) in 0-10, 02(7.69%) in 11-20, 04 (15.390/o) in 31-40, 02 (7.69%) in 41-50, 51·60 and also in patients above 61 years.

**Table 2:** Incidence of Different Modes of Injury

| Type of Injury | No. of Cases | Percentage |
|---|---|---|
| Road traffic accidents | 98 | 65.34 |
| Fall | 40 | 26.67 |
| Assault | 06 | 4.00 |
| Others | 06 | 4.00 |
| Total | 150 | 100.00 |

According to statistical analysis, RTA was found to be the commonest mode of head injury with an incidence of 98 (65.34%) followed by other modes of injury such as falls with an incidence of 40 patients (26.67%), assaults 06 (04.00%) and others 06 patients (04.00%).

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**Table 3:** Incidence of the Types of Fractures as Observed on CT scan

| Type of Fracture | No. of Cases | Percentage |
|---|---|---|
| Linear | 67 | 72.04 |
| Depressed | 18 | 19.35 |
| Skull Base | 8 | 8.61 |
| Total | 93 | 100.00 |

According to the study, commonest type of fractures associated with head injury were linear fractures accounting for 67(72.04%), followed by depressed fractures 18(19.35%) and sku11 base fractures 8(8.61%).

**Table 4:** Fracture detection with conventional skull radio graph and CT

| Imaging Modality | Number of Patients | Percentage |
|---|---|---|
| Fractures detected only on CT | 93 | 100.00 |
| Fractures detected on plain radiograph | 69 | 74.19 |
| Only on CT | 24 | 25.80 |
| Only on X-ray | -- | -- |

As depicted in the table, out of a total of 93 fractures detected on CT, 24(25 .80%) fractures were detected only on CT and were missed on plain radiograph.69 (74.19%) fractures were detected on plain radiographs too.

**Table 5:** Grading of Head Injury Based on GCS Score

| Type of Head Injury | No. of Cases | Percentage |
|---|---|---|
| Mild (13-14) | 48 | 32.00 |
| Moderate (9-12) | 40 | 26.7 |
| Severe (< 8) | 62 | 41.3 |
| Total | 150 | 100.00 |

According to the study, cases with severe head injury with GCS score of <8 were the commonest accounting for 41.3% of all cases followed by cases with mild head injury with GCS score of 13-14 accounting for 48 cases (32%) and with moderate head 1njury were least common accounting for 26.7%.

## Discussion

Males were found to be more predominant than females in the present study. Incidence reported in other studies were Kalsbeck [5] 59%, Zimmermann *et al.* [6] 79%, James F Holmes *et al.* [7] 65%, Masih Saboori *et al.* [8] 78.2%. This male preponderance can be attributed to the increased outdoor activity and travel by males.

In the present study patients in the age group of 21-30 years formed the bulk of the study. Study by Ogunseyinde AO *et al.* [9] also stated that head injury was common in patients younger than 35 yrs. Fary Khan *et al.* [10] (2003) in their study mentioned that peak incidence of traumatic brain injuries were between 15-35 years age group and Masih Saboori *et al.* [8] (2007) reported a mean age of 29 years for patients of head injury. By the studies it is noted that head injury is seen commonly in socially and economically productive age group of the population and hence has an impact on the financial aspect of the family.

Road traffic accidents were found to be the commonest mode of injury in the present study accounting for 65.34%. Zimmermann *et al.* [6] also reported RTA as the major cause albeit at a lesser population (39%). Igun G 079 in his study reported vehicular accidents as the major mode of head injury with an incidence of 72% and Masih Saboori *et al.* [8] reported incidence

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of 88.2%. This increased incidence due to RTA can be attributed to the increased vehicular movement in cohesion with the population explosion.
Linear fractures were found to be commonest type of fracture with an incidence of 72.04% followed by depressed fractures accounting for 19.35%.

## Conclusion

Head injury causes more deaths and disability than any other neurologic condition before age 50 and occurs in >70% of accidents, which are the leading cause of death in men <35 year old.
Neuroimaging techniques provide some of the most important diagnostic, prognostic, and pathophysiological information in the management of brain injury. Anatomical imaging modalities can help assess intracranial hemorrhage, fractures and other structural lesions. Beside the correct diagnosis itself the time to establish a diagnosis above all has a crucial impact on successful management and good outcome of these patients.

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