

## Profile of Fatal Craniocerebral Injuries

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### Abstract

Head injuries or Craniocerebral injuries occupy a significant place due to high morbidity and mortality in developing countries like India. With severe paucity of trained man power, investigative facilities and rehabilitative services, traumatic brain injuries place considerable burden on care givers in different situations. Head injury is the most common emergency encountered in trauma units and casualty departments. The present study was undertaken on 100 victims died due to head injury to find their age & sex distribution, timing of head injury, survival period, types of skull fractures & types of intracranial haemorrhage. The highest incidence was seen in age group of 21-30 years and males clearly outnumbered females. In the present study, most of the incidents occurred between 6 PM to 12 midnight. Maximum number of victims died on spot.

Linear fracture was the commonest type of skull fracture & combination of subdural haemorrhage with subarachnoid haemorrhage was the commonest intracranial haemorrhage.

**Keywords:** Head Injury; Skull Fractures; Intracranial Haemorrhages.

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### Introduction

Head accommodates one of the most vital organs, the brain. Generally speaking, it is well protected within the bony cranial cage. But once the impact of force crosses the protective threshold, then life is invariably in danger [1]. One of the characteristic features of brain is that once it is damaged, regeneration or complete healing does not occur. Head injury is commonly used as synonym to craniocerebral injury, acquired brain injury and traumatic brain injury [2].

National Advisory Neurological Disease and Stroke Council has defined craniocerebral injury as "a morbid state resulting from gross or subtle

structural changes in the scalp, skull and / or the contents of the skull, produced by mechanical forces". Head injury is the most common emergency encountered in trauma units and casualty departments [3].

At the global level, it is estimated that the annual incidence and mortality from Acquired Brain Injuries (ABIs) or Traumatic Brain Injuries (TBIs) is 200 and 20 per 1,00,000 per year, respectively. Like other developing countries, India is also passing through rapid industrialization, urbanization, motorization, economic liberalization and changing social milieu, and is facing a myriad of health, social, economic and technological problems at the beginning of the new millennium. An emerging problem due to this demographic, epidemiological and social transition has been an increase of injuries especially head injuries and consequent effects. The complex interaction of human, vehicle and environmental factors along with lack of sustainable preventive programs has contributed to this 'silent epidemic' of injuries. In India incidence of head injuries is 160/100,000/ year, prevalence is 97/100,000/year, mortality is 20/100,000/year and case fatality rate is 9% [4].

The study of craniocerebral injury cases from

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medico legal point of view among rural population is still lacking. Most of the studies are done in urban areas only. Hence present work was carried out in rural area of Loni which has patient's drain from various villages of Ahmednagar, Nashik and Aurangabad Districts.

Main objective of the study is to assess and evaluate the medico-legal profile of craniocerebral injuries resulting from all causes. It is expected that the study will not only help in medico-legal investigation but also will be a good reference for prevention and management of head injury cases.

### Material and Methods

The present study was carried out in the Department of Forensic Medicine & Toxicology, Rural Medical College, Loni, in Dist. Ahmednagar, Maharashtra. Total 100 cases of head injuries due to various reasons were studied. Preliminary data related to name, age, sex, address, brought by whom, date and time of incidence, date and time of admission, treatment given, date and time of death was gathered from police inquest report, hospital papers, concerned investigating officer and also from relatives. The available record of radiological investigations including X ray film, and CT scan were also carefully reviewed. During autopsy, detailed examination was carried out & both external and injuries were noted. Data was analyzed and presented in this paper.

### Observations

#### Age and Sex Distribution

The highest incidence was seen in age group of 21-30 years comprising 37% cases followed by 31-40 years having 19% cases. The lowest incidence was seen in age group of more than 70 years (2%). Males comprised 82% of the total victims with male to female ratio as 4.5:1.

**Table 1:** Distribution of Cases according to Age and Sex.

Age Group (Years)	Male	Female	Total No (%)
0-10	5	5	10 (10)
11-20	3	2	5 (5)
21-30	34	3	37 (37)
31-40	18	1	19 (19)
41-50	11	4	15 (15)
51-60	5	2	7 (7)
61-70	4	1	5 (5)
> 70	2	0	2 (2)
<b>Total</b>	<b>82</b>	<b>18</b>	<b>100</b>

#### Time of Incident

In the present study, most of the incidents occurred between 6 PM to 12 midnight comprising 41% of total cases, followed by time interval 12 noon to 6 PM (28%). The least number of cases (11%) occurred 6 AM to 12 noon.

**Table 2:** Distribution of Cases according to the Time of Injury

Time of Incidence	No. of Cases (%)
12 Midnight-06 A.M.	20(20)
06 A.M.-12 Noon	11(11)
12 Noon-06 P.M.	28(28)
06 P.M.-12 Midnight	41(41)
<b>Total</b>	<b>100(100)</b>

#### Survival Period

The maximum number of victims (57%) died on spot, followed by 14% victims died within 24 hours after sustaining injuries. Only 5% victims survived for more than 7 days.

**Table 3:** Distribution of Cases according to the Survival Period.

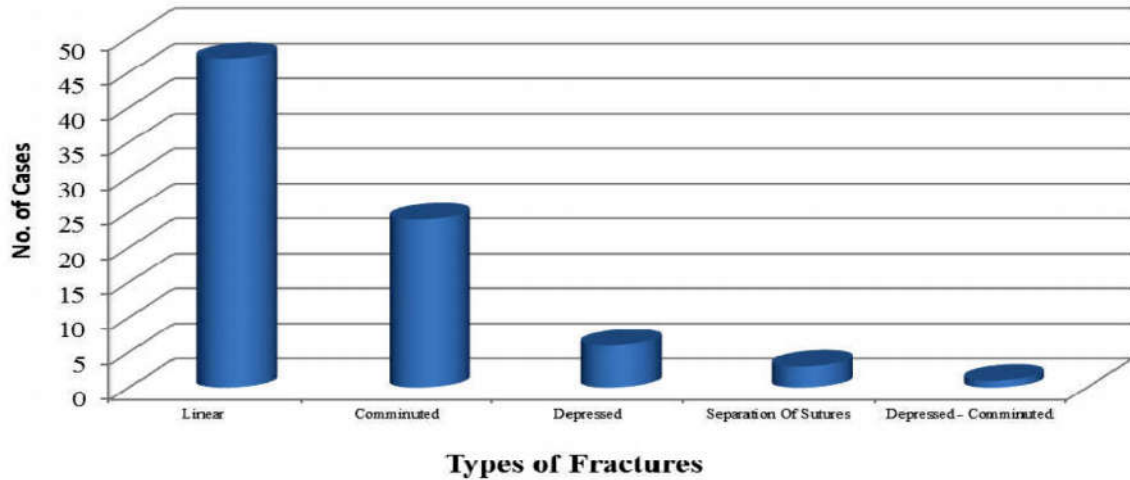
Survival Period	No. of Cases (%)
Death on Spot	57 (57)
0-6 Hrs	11 (11)
6-12 Hrs	0 (0)
12-24 Hrs	3 (3)
1-2 Days	5 (5)
2-4 Days	11 (11)
4-7 Days	8 (8)
More Than 7days	5 (5)
<b>Total</b>	<b>100(100)</b>

#### Incidence of Skull Fracture

In present study, 71% fatal cases of craniocerebral injury showed fractures of skull in various forms, while 29% fatal craniocerebral injury cases did not reveal any fracture. 81 fractures were observed in 71 cases. Out of which linear fracture was the commonest type 47(58.02%) and depressed comminuted type was least common 1 (1.23%).

**Table 4:** Distribution according to the Type of Fracture of Skull

Type of Fracture	No. of Fracture (%)
Linear	47 (58.02)
Comminuted	24 (29.62)
Depressed	6(7.40)
Separation of Sutures	3(3.70)
Depressed-Comminuted	1(1.23)
<b>Total</b>	<b>81(100)</b>



**Graph 1:** Distribution according to the Type of Fracture of Skull.

*Types of Intracranial Haemorrhages*

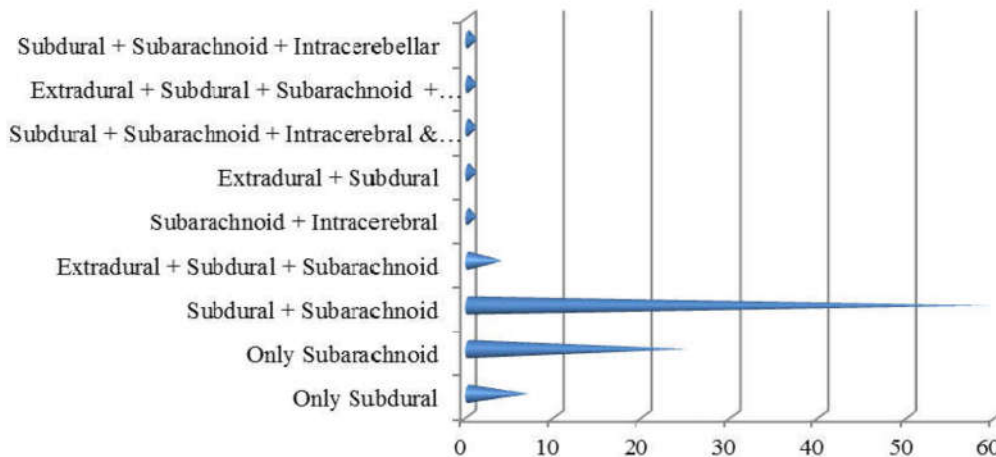
Intracranial haemorrhages were observed in all the cases (100) studied. Isolated subarachnoid haemorrhage was seen in 25% cases. Subdural

haemorrhage was seen in 7% cases. Combination of subdural haemorrhage with subarachnoid haemorrhage was on the first place (59%), followed by other combination.

**Table 5:** Distribution of Cases according to the Type of Intracranial Hemorrhages

Type of Hemorrhage	No. of Cases (%)
Only Subdural	7 (7)
Only Subarachnoid	25 (25)
Subdural + Subarachnoid	59 (59)
Extradural + Subdural + Subarachnoid	4 (4)
Subarachnoid + Intracerebral	1 (1)
Extradural + Subdural	1 (1)
Subdural + Subarachnoid + Intracerebral & Intraventricular	1 (1)
Extradural + Subdural + Subarachnoid + Intraventricular	1 (1)
Subdural + Subarachnoid + Intracerebellar	1 (1)
<b>Total</b>	<b>100 (100)</b>

**Distribution of cases according to the type of Intracranial Hemorrhages**



**Graph 2:** Distribution of Cases according to the Type of Intracranial Hemorrhages

## Discussion

In this study, highest incidence was seen in age group of 21-30 years comprising 37% cases followed by 31-40 years having 19% cases. The lowest incidence was seen in age group of more than 70 years (2%). The similar findings are noted by Tirpude BH et al [5] and Tandle RM and Keoliya AN [6]. The maximum number of cases in age group of 21-30 years can be explained by the fact that this age group is really active group, as it is necessary to go out of house for doing the service and/ or to do the work, day to day activities for maintenance of life and survival. Individuals in the age group more than 60 years and less than 20 years were the least affected which is explained by the fact that these age groups are dependent age group and having less outdoor activities as well as external affairs. If sex wise distribution of cases is considered, males clearly outnumbered females with male to female ratio as 4.5:1. This is in accordance with the other researcher like Agarwal SS et al [7] and Vij A et al [8]. High preponderance of males in fatal craniocerebral injury can be attributed to their involvement in activities outside the home (i.e. driving, strenuous work, industrial work and agricultural work). While females mainly do household work which is unlikely to expose them to such accidents.

The maximum numbers of accidents were reported between between 6 PM to 12 midnight comprising 41% of total cases, followed by time interval 12 noon to 6 PM (28%). The least number of cases (11%) occurred 6 AM to 12 noon. These findings are consistent with the study of Sinha VS et al [9] and Parmar P et al [10] Preponderance of head injury cases during evening and night time due to lack of street lights, poor condition of vehicles (e.g. defective head lights), poor road conditions and lack of signals on road in rural area. Attention of person is disturbed due to sleep, fatigue and also due to alcohol consumption.

The maximum number of victims (57%) died on spot, followed by 14% victims died within 24 hours after sustaining injuries. Only 5% victims survived for more than 7 days. Similar findings are noted by Murty OP et al [11]. Maximum number of victims dies while on the way to hospital (brought in death cases) or died within 24 hours because severe injuries in the form of intracranial haemorrhages or contusions and lacerations of brain which are not compatible with life. Delay in the shifting of the patient from the spot of incidence to the hospital also responsible for immediate death.

In present study, 71% fatal cases of craniocerebral injury showed fractures of skull in various forms, while 29% fatal craniocerebral injury cases did not reveal any fracture. Fracture of skull indicates an impression of severe injury and the impact occurred with considerable force.

81 fractures were observed in 71 cases. This finding is consistent with the findings of Agarwal SS et al [7] and Elesha SO and Daramola AO [12]. Out of which linear fracture was the commonest type 47 (58.02%) and depressed comminuted type was least common 1 (1.23%). Similar trends are seen by Patel DJ and Agnihotram G [13] and Menon A et al [14]. Intracranial haemorrhages were observed in all the cases (100) studied. Isolated subarachnoid haemorrhage was seen in 25% cases. Subdural haemorrhage was seen in 7% cases. Combination of subdural haemorrhage with subarachnoid haemorrhage was on the first place (59%), followed by other combination. These findings are consistent with the study of Patil AM and Walter FV [15] and Shaikh MI et al [16].

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