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## Analysis of factors influencing outcome in head injury patients: A study of 200 cases

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### Abstract

**Background:** A clear Understanding of injury patterns, causes and outcome of patients of head injury is essential for establishment of preventive strategies as well as treatment protocols. Such data is lacking in our environment as no local study has been done. The objective of this study is to determine age and sex distribution of head injury cases, etiological factors, indications of surgical interventions, various complications and their management, morbidity and mortality of head injury patients and the risk factors associated with morbidity and mortality. So as to improve management of head injury patients.

**Methods:** This was a prospective study carried out at Dept. of surgery at us tertiary care center over a period of two years from October 2015 to September 2017. Patients who were admitted in wards and ICU of all age groups and of both sexes having head injury were selected for analysis.

**Results and conclusion:** incidence of head injury was more in younger age males, rural population, evening and night time. Adverse outcomes were associated with Alcoholism, poor GCS presence of comorbidities.

**Keywords:** Head injury, road traffic accidents, GCS, traumatic brain injuries

### Introduction

The uncertainty that exists about the likely outcome after traumatic brain injury (TBI) is encapsulated in the Hippocratic aphorism: "No head injury is so serious that it should be despaired of nor so trivial that it can be ignored." Prognosis are still often unduly optimistic, unnecessarily pessimistic, or inappropriately ambiguous. It still remains impossible to say with certainty what will be the future course of events in an individual patient<sup>[4]</sup>, Since 1970's Glasgow coma scale (GCS) and computed tomography (CT) scanning has been used in evaluating head injury patients<sup>[5]</sup>. Trauma presents with variety of injuries and problems that demand rapid evaluation, discussion, improvisation and intervention to save life and prevent permanent disability<sup>[6]</sup>. The purpose of this study was to identify risk factors associated with TBI. Majority of head injuries and their morbidity and mortality, is preventable. A clear Understanding of injury patterns, causes and outcome of these patients is essential for establishment of preventive strategies as well as treatment protocols.

### Materials and Methods

This was a prospective carried out at Dept. of surgery at us tertiary care center over a period of two years from October 2015 to September 2017.

200 patients who were admitted in wards, ICU at Dept. of surgery in Dr. Vaishampayan Memorial Govt. Medical College and Shri Chhatrapati Shivaji Maharaj Sarvopchar Rughalaya (Tertiary Care Centre) were included in the study. Data collected by simple random sampling method. Patients of all age groups and of both sexes having head injury were selected for analysis. Patients were evaluated in detail by clinical history, thorough examination, radiographs, CT scan and MRI whenever necessary. Patients treated either conservatively or surgically depending upon requirement. The outcome of the patient and various factors influencing that outcome analyzed in this study. The patients were followed up for 4 years post treatment up to April 2021 for any complications or adverse events.

### Observations and Results

Mean age of head injury patients is 33.82years. Youngest and oldest individuals were 1 year and 71 years old respectively.

Most common age group found was 21-30 years (31.5%) followed by 31- 40 years (23%). Case fatality rate was highest in the 41-5 year's age group.

The ratio of males to females affected is 3.25:1.00. In males, the case fatality rate was 3.3% and in females it was 2.1%.

Majority (65%) were from rural areas and 35% were from urban areas. Case fatality rate of the rural population was 3.07% and of the urban population was 2.85%.

Vomiting was the most common presenting symptom. It was present in 62.5% cases. 23% were having giddiness. 25% were having headache. 3% were having convulsions. 5.5% were having ENT bleeding. 13% were having drowsiness. 8.5% were having unconsciousness. 2% were having facial swelling. 0.5% were having black eye. 0.5% were having abnormal behavior. Death rate observed in patients with unconsciousness (35%), convulsions (16.6%), vomiting (0.8%)

Most common time of occurrence was from 6PM to 9PM (26.5%) followed by 3 PM to 6 PM (26%). Least number of head injuries occurred early in the morning from 3AM to 6AM (2%). Death rate in head injuries was maximum from 9PM to 12 AM (10.53%).

80.5% approached the hospital within 6 hours. 14.5% reached in 6-12 hours. 3% required 12-24 hours to reach hospital after head injury. 2% reached hospital after 24 hours of head injury. Average time required to reach the hospital is 4.9 hours. Death rate in patients who reached hospital within 6 hours is 0.6%, in patients who reached hospital 6-12 hours is 3.4%, in patients who reached hospital 12-24 hours is 33% and in patients who reached hospital after 24 hours is 50%.

Most common cause was found to be road traffic accidents (62.5%). Assault is the second most common cause (23.5%). Fall and other causes contributed 14%. In patients with road traffic accidents, death occurred in 4.8% of patients.

44% of patients who had head injury were alcoholics. Death rate of alcoholic patients after head injury was 4.5% and of non-alcoholic patients was 1.8%.

Diabetes found in 2.5% cases. Hypertension found in 10 5% cases. Anemia is found in 11 5.5% cases. Bleeding disorder found in 4.2% cases. Convulsive disorder found in 2% cases. Psychiatric disorder found in 0.5% cases. Death rate of diabetes was 20% and that of hypertension was 10%.

Chest trauma was found in 28% patients with a death rate of 6.8%. Abdominal trauma was found in 14.5% patients with death rate 7.1%. Injury to limbs found in 25% patients with death rate 2%. Significant injury to extremities causing fracture was found in 4% patients with a death rate 12.5%.

.42% were having CLW to head while 58% patients were having blunt trauma. Fatality rate of patients with blunt trauma was 1.7% while CLW was 4.8%.

95% patients were vitally stable and 5% were unstable on reaching hospital. Death rate of vitally stable patients was 1.57%. In patients with unstable vitals, the death rate was 30%.

Higher functions were normal in 78.5% and abnormal in 21.5%. Motor functions were normal in 98.5% and abnormal in 31.5%. Sensory functions were normal in 98.5% and abnormal in 31.5%. Pupillary responses were normal in 92.5% patients and abnormal in 7.5% patients. In patients with impaired higher functions 3.8% died. In patients with abnormal pupillary response 20% died.

77% had mild head injury and GCS was between 13-15. 16.5% had moderate head injury and GCS was between 9-12. 6.5% had severe head injury and GCS was between 3-8. Death rate among severe head injury patients was 46%.

Skull and facial bone fractures is the most common finding

found on CT scan (24.5%). Cerebral edema was found in 7% patients. Contusion was found in 13% patients. EDH was found in 5% patients. SDH was found in 11% patients. SAH was found in 11% patients. Infarct was found in 1.5% patients. Pneumocephalus was found in 3% patients. Interventricular bleed found in 0.5% patients. Death among patients with skull or facial bone fracture occurred in 8.16% cases. In patients with contusions death occurred in 3.8% cases. In patients with EDH death occurred in 30% cases. In patients with SDH death occurred in 4.5% cases. In patients with SAH death occurred in 13.63% cases. In patients with pneumocephalus death occurred in 16.6% cases. In patients with interventricular bleeding death occurred in 100% cases.

95% of patients were treated conservatively and the death rate was 2.1%. 5% of patients required surgical management and the death rate of surgeries was 20%.

Majority (62.5%) were admitted from 1-3 days followed by 4-6 days (22.5%). Average duration of hospital stay is 3.7 days. 50% of the patients who required hospital stay more than 12 days have died. Whereas, in those who were admitted for 1-3 days, only 2.4% died and in those who admitted 4-6days, only 2.2% died.

Follow up records of 97% patients. 85% of patients were asymptomatic, 7.7% had headache, 4.1% had giddiness, 1% had Neurological deficit, 1% had psychological symptoms, and 0.5% had cognitive impairment.

**Observation tables**

**Table 1: Age and outcome**

Age group in years	No. of patients	Percentage	Deaths	Percentage
1-10	15	7.5%	-	-
11-20	20	10%	2	10%
21-30	63	31.5%	0	-
31-40	46	23%	2	4.3%
41-50	29	14.5%	2	6.9%
51-60	16	8%	-	-
61-70	09	4.5%	-	-
71-80	02	1%	-	-
Total	200	100%	-	-

**Table 2: Demographic Distribution and Outcome**

Location	No. of patients	Percentage	Deaths	Percentage
Rural	130	65%	4	3.07%
Urban	70	35%	2	2.85%

**Table 3: Presenting Clinical Features and outcome**

Presenting Clinical Features	No. of patients	Percentage	Deaths	Percentage
Giddiness	46	23%	-	-
Vomiting	125	62.5%	1	0.8%
Headache	50	25%	-	-
Convulsions	06	3%	1-	16.6%
ENT bleeding	11	5.5%	-	-
Black Eye	01	0.5%	-	-
Abnormal behaviour	01	0.5%	-	-
Drowsy	26	13%	-	-
Unconsdous	17	8.5%	6	35%
Facial swelling	04	2%	-	-

**Table 4:** Time of Head injury and outcome

Time of Head injury	No. of patients	Percentage	Deaths	Percentage
12.01AM-3.00AM	06	3%	-	-
3.01AM-6.00AM	04	2%	-	-
6.01AM-9.00AM	12	6%	-	-
9.01AM-12.00PM	11	5.5%	-	-
12.01PM-3.00PM	42	21%	3	7.1%
3.01PM-6.00PM	52	26%	1	1.9%
6.01PM-9.00PM	53	26.5%	-	-
9.01PM-12.00AM	19	9.5%	2	10.53%
Total	200	100%	-	-

**Table 5:** Nature of Head injury and Outcome

Nature of injury	No. of patients	Percentage	Deaths	Percentage
RTA	125	62.5%	6	4.8%
Assault	47	23.5%	-	-
Fall	28	14%	-	-
Total	200	100%	-	-

**Table 6:** History of Alcoholism and outcome

History of Alcoholism	No. of patients	Percentage	Deaths	Percentage
Alcoholic patient	88	44%	4	4.5%
Non-alcoholic patient	112	56%	2	1.8%
Total	200	100%	6	-

**Table 7:** Associated Co-morbidities and Outcome

Associated co-morbidities	No. of patients	Percentage	Deaths	Percentage
Diabetes	05	2.5%	1	20%
Hypertension	10	5%	1	10%
Anaemia	11	5.5%	-	-
Bleeding disorder	04	2%	-	-
Seizure disorder	04	2%	-	-
Psychiatric disorder	01	2%	-	-

**Table 8:** CNS Examination findings and outcome

CNS Examination	Normal	Abnormal	Deaths	Percentage
Higher functions	157	43	6	13.95%
Motor functions	197	03	-	-
Sensory function	197	03	-	-
Pupillary response	185	15	3	20%

**Table 9:** Glasgow coma scale and outcome

GCS score	No. of patients	Percentage	Deaths	Percentage
Mild (13-15)	154	77%	-	-
Moderate(9-12)	33	16.5%	-	-
Severe(3-8)	13	6.5%	6	46%
Total	200	100%	-	-

**Table 10:** CT scan findings and outcome

CT scan finding	No. of patients	Percentage	Deaths	Percentage
Intraventricular bleeding	01	0.5%	1	100%
Pneumocephalus	06	03%	1	16.6%
Bone #	49	24.5%	4	8.16%
Cerebralo edema	14	07%	-	-
Contusion	26	13%	1	3.8%
EDH	10	05%	3	30%
SDH	22	11%	1	4.5%
SAH	22	11%	3	13.63%
Infarct	03	1.5%	-	-

## Discussion

As per results of this study, Head injuries are more common in younger age males (in our study mean age was 33.8 years and male: female ratio was 3.25:1). It is due to more outdoor

activities, increasing use of motor vehicles, alcohol addiction and less self-awareness. Mortalities due to head injuries are also more common in this age. But the outcome in males is better than in females. In developing country like India where the majority of people live in rural areas, head injuries are also increasing in the rural population. Mortality is also more in the rural population due to lack of neurosurgical healthcare facilities in rural areas, low socioeconomic status, less education and awareness and delay in treatment.

Head injuries most commonly occur at evening and night time (in our study most common time was 6 p.m. to 9 p.m.). It is mostly due to decreased sunlight, more traffic, availability of new high-speed vehicles, ignorance or unawareness of traffic rules and alcoholism. Road traffic accidents are the most common cause of head injury (in our study 62.5% patients had road traffic accidents). Alcoholism is one of the major responsible factors for road traffic accidents (in our study alcoholism is associated with 44% of patients).

Vomiting, headache and dizziness are the most common presenting symptoms in head injury patients (in our study vomiting was present in 65%, giddiness in 23% and headache in 25% patients). Outcome is worst when the patient presents with unconsciousness and convulsions. In patients who present to hospitals with unstable vitals and abnormal pupillary signs, mortality is higher. GCS is a very important predictor of outcome. Outcome is good in patients with GCS more than 12, moderate in patients with GCS between 9-12 and poor in patients with GCS below 9. Skull and facial bone fractures are the most common finding found on CT scan (24.5% patients were having skull and facial bone fracture in our study). Intracranial bleeding such as SDH, EDH, Contusions are found in relatively less patients.

We have compared this study with various other studies like study at SKIMS, Srinagar, AIIMS, New Delhi, Holcomb *et al.*, Dhandapani *et al.*, Rejeb Belfekih Imen *et al.*, etc. Our results were matching these studies in most of the aspects. The variations may have occurred due to variation in sample size, locality and study period.

## Conclusion

Head injury is a major public health problem in our community. It is more common in younger age males. Head injuries most commonly occur at evening and night time and road traffic accidents being most common cause. Alcoholism is leading responsible factor for road traffic accidents and contribute to worse outcome. Vomiting, headache and dizziness are the most common presenting symptoms in head injury patients. Outcome is worse when a patient presents with unconsciousness and convulsions, GCS less than 9, unstable vitals and abnormal pupillary signs, associated severe injury to other body organs, associated comorbidities. Outcome is good in patients who come early to hospital, GCS more than 12 and no other associated injury or comorbidity. Majority of patients can be treated conservatively except few requiring surgical interventions who present with or at risk of brainstem compression due to traumatic brain injury.

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