Evaluation of Incidence, Mode of Injury and Clinical Outcomes of Traumatic Brain Injury in Tertiary Health Center in Southern Rajasthan

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Abstract
According to WHO, Traumatic Brain Injury (TBI) will be one of the major cause of mortality, morbidity and disability by the year 2020. Since burden of TBI is manifest throughout the world but it is especially prominent in India which faces a high preponderance of risk factors for causes of TBI.

Aims and Objectives: To evaluate incidence, mode of injury, clinical outcomes and surgical intervention of TBI in Tertiary Health Center in Southern Rajasthan.

Material and Method: For the study, 1000 patients of TBI who were admitted to Department of Neurosurgery ICU of Geetanjali Medical College and Hospital, Udaipur during the period of January 2014-November 2017 were evaluated. Clinical status of patients was grossly assessed with Glasgow Coma Scale (GCS).

Result: Among 1000 patients, mean age was found to be 27.61 ± 4.89 years. 74.3% were males and 25.7% were females. Among total cases, 28.3% had severe, 11.1% had mild and 60.0% had mild injury. Mortality in patient with severe injury was 44.17% and only 5.41% expired having moderate injury. RTA was found to be most common mode of injury 47.4%. 51.2% had Scalp laceration, 41.9% with Contusion and 41% had Skull Fractures. Regarding surgical intervention, surgery was most common

Keywords: Traumatic Brain Injury, Road Traffic Accidents, Mortality, Glasgow coma scale, Computerized Tomography Scan.

Introduction
Traumatic Brain injury (TBI) not only has considerable morbidity and mortality, but it is a major cause of epilepsy. TBI is defined as an alteration in brain function manifest as confusion, altered level of consciousness, seizures, coma or focal sensory or motor neurologic deficit resulting from blunt or penetrating force to the head. In mild TBI, subtle behavioral and neuropsychological changes may be only symptom.\textsuperscript{1} TBI is estimated to be the primary cause of death in one third to one half of the traumatic deaths.\textsuperscript{2} Thus TBI constitutes a major health and socioeconomic problem throughout the world.\textsuperscript{3,4} It is prevalent in both low and high income people and affects people of all ages. TBI is called the ‘silent epidemic’ because problem resulting from TBI are often not immediately visible, and TBI patients are not very vociferous. The term silent further reflects the common
underestimation of the actual incidence and that society is often unaware of the impact of TBI.5

Material and Method
The study was carried out in the Department of Neurosurgery at Geetanjali Medical College and Hospital, Udaipur during the period of January 2014 - November 2017. For the study total of 1000 patients with Traumatic Brain Injury from Intensive Care Unit (ICU) were included. Clinical Status of patients was assessed using Glasgow Coma Scales. Computerized Tomography scan was done of all TBI patients.

Observation and Results
Out of total patients majority 74.3% were males. 41.6% of patients were students followed by 23.8% of Farmers. Regarding socioeconomic status 48% patients were from middle class followed by 44.9% of Lower class and only 7.1% patients were of Higher Class. 52.6% were from rural area and 47.4% were from urban area. Table 1
It was observed that most commonly affected group belonged to age group of 21-40 years (41.9%) followed by patients in age group of 1-10 years (20.8%). mean age of injured patients was found to be 27.61 ± 4.89 years Regarding mode of injury, Road Traffic Accident was found to be most common cause of injury (47.4%) followed by injury due to fall from height in 31.9%. 14.3% of injury was due to Assault. Out of 474 cases of injury due of RTA, 264 (55.7%) were of age group of 21-40 years. Out of 319 cases due to fall from height 155(48.59%) were of age group 1-10 years and out of 143 assault cases 52 (36.36%) were of age group 41-50 years. Table 2
Overall mortality was found to be 13.1%. Out of 100 cases, 606(60.6%) were mild, 283(28.3%) were severe and 111(11.1%) were moderate TBI. According to GCS out of 283 cases with severe TBI 125(44.17%) while mortality in 111 moderate cases was 6(5.41%) and not a single patient with mild TBI expired. Table 3
It was observed that there was direct correlation between findings of CT scan and increase in number of symptoms. Out of total 1000 cases, 512(51.2%) had Scalp laceration, 419(41.9%) with Contusion and 410(41%) had Skull Fractures. Among the systemic injuries Raccon eye was in 22.9% followed by long bone injury in 16.3%. Table 4.
Regarding surgical intervention, surgery was most common and done in 55% of cases followed by 51.8% Craniotomy and 41% Duraplasty. Lobectomy was done only in4.6% cases. Table 5

Figure 1: Distribution of case according to age
Figure 2: Distribution of cases according mode of injury

![Mode of injury distribution](image)

Figure 3: Outcome of TBI

![Outcome of TBI](image)

Table 1: Demographic profile of study subjects

| Variables       | Number of subjects | Percentage |
|-----------------|--------------------|------------|
| Gender          |                    |            |
| Male            | 743                | 74.3       |
| Female          | 257                | 25.7       |
| Occupation      |                    |            |
| Students        | 416                | 41.6       |
| Service         | 180                | 18.0       |
| Business        | 36                 | 3.6        |
| Retired         | 13                 | 1.3        |
| Farmer          | 238                | 23.8       |
| Others          | 117                | 11.7       |
| Socioeconomic Status |        |            |
| Upper           | 71                 | 7.1        |
| Middle          | 480                | 48.0       |
| Lower           | 449                | 44.9       |
| Area of living  |                    |            |
| Rural           | 526                | 52.6       |
| Urban           | 474                | 47.4       |
### Table 2: Distribution of Mode of Injury according to age

| Age group(years) | RTA (%) | Fall from height (%) | Fall of object (%) | Assault (%) | Others (%) | Total (%) |
|------------------|---------|----------------------|-------------------|------------|------------|-----------|
| Less than 1      | 2 (33.33%) | -                    | -                 | -          | -          | 6 (100%)  |
| 1-10             | 21 (10.1%) | 155 (74.52%)         | 22 (10.58%)       | 6 (2.88%)  | 4 (1.92%)  | 208 (100%)|
| 11-20            | 83 (58.45%) | 28 (19.72%)          | 3 (2.11%)         | 28 (19.72%)| -          | 142 (100%)|
| 21-30            | 139 (69.15%) | 31 (15.42%)          | 7 (3.48%)         | 24 (11.94%)| -          | 201 (100%)|
| 31-40            | 125 (57.34%) | 55 (22.23%)          | 10 (4.59%)        | 28 (12.84%)| -          | 218 (100%)|
| 41-50            | 73 (42.94%)  | 29 (17.06%)          | 9 (5.29%)         | 52 (30.59%)| 7 (4.12%)  | 170 (100%)|
| More than 50     | 31 (56.36%)  | -                    | -                 | 5 (9.09%)  | 2 (3.64%)  | 55 (100%) |
| Total            | 474 (47.4%)  | 319 (31.9%)          | 51 (5.1%)         | 143 (14.3%)| 13 (1.3%)  | 1000 (100%)|

### Table 3: Distribution of GCS score with outcome

| GCS score | Outcome | Expired (%) | Survived (%) | Total (%) |
|-----------|---------|-------------|--------------|-----------|
| Severe    | 125 (44.17%) | 158 (55.83%) | 283 (100%)  |
| Moderate  | 6 (5.41%)   | 105 (94.59%) | 111 (100%)  |
| Mild      | -         | 606 (99.83%) | 606 (100%)  |
| Total     | 131 (13.1%) | 869 (86.9%)  | 1000 (100%) |

### Table 4: Computerized Tomography Scan findings

| CT Scan findings            | Number of subjects | Percentage |
|-----------------------------|--------------------|------------|
| Scalp laceration            | 512                | 51.2       |
| Contusion                   | 419                | 41.9       |
| Skull Fractures             | 410                | 41.0       |
| Extra Dural Hematoma        | 246                | 24.6       |
| Raccon eyes                 | 229                | 22.9       |
| Long bone injury            | 163                | 16.3       |
| Midline shift               | 154                | 15.4       |
| Facial laceration           | 133                | 13.3       |
| Subarachnoid Hemorrhage     | 121                | 12.1       |
| Pneumocephalous             | 101                | 10.1       |
| Maxillofacial Injury        | 92                 | 9.2        |
| Chest injury                | 83                 | 8.3        |
| ICH                         | 76                 | 7.6        |
| Acute SDH                   | 61                 | 6.1        |
| Pelvic injury               | 54                 | 5.4        |
| Cervical spine              | 39                 | 3.9        |
| Chronic SDH                 | 23                 | 2.3        |

### Table 5: Surgical intervention of Study subjects

| CT Scan findings  | Number of subjects | Percentage |
|-------------------|--------------------|------------|
| Surgery           | 550                | 55.0       |
| Craniotomy        | 518                | 51.8       |
| Duraplasty        | 410                | 41.0       |
| Tracheostomy      | 365                | 36.5       |
| Brain bulge       | 305                | 30.5       |
| Lobectomy         | 46                 | 4.6        |
Discussion

In this study most affected group of patient 41.9% belonged to age group of 21-40 years and majority 74.3% of them were males which was similar to the findings of the studies. In this study RTA was found to be the most common cause of Injury (47.4%) followed by fall from height (31.9%), which is also similar to findings of Gururaj G and Pathak A.

41.6% of patients were students followed by 23.8% of Farmers. Regarding socioeconomic status 48% patients were from middle class followed by 44.9% of Lower class and only 7.1% patients were of Higher Class. 52.6% were from rural area and 47.4% were from urban area, these findings are close to the findings of Agarwal A.

In this study mortality was found to be 13.1%. 60.6% were mild, 28.3% were severe and 11.1% were moderate TBI. According to GCS out of 283 cases with severe TBI, 44.17% expired and in 111 moderate cases was 5.41% patients expired and not a single patient with mild TBI expired. These findings are similar to the findings of Bhola EM. Whereas mortality rate in severe TBI was 33% and 2.5% according to Foulkes MA respectively.

In this study, 51.2% had Scalp laceration, 41.9% with Contusion and 41% had Skull Fractures. According to the finding of other studies, incidence of SDH and SAH was most common in injuries due to RTA while EDH was least common whereas in this study EDH was 24.6%.

Conclusion

Most common cause of TBI is RTA and most of the cases are in productive age group of 21-40 years. This incidence is high due to traffic patterns and lack of preventive measures. Thus it is very essential to provide knowledge about the cause of Head Injury and measure to prevent them from being injured. Knowledge about pattern of TBI may be very useful in making policies for the prevention before and due to injury.

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