



Epidemiological Analysis and Clinical Characteristics of Traumatic Brain Injury in Southern Rajasthan: A Hospital Based Study

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Abstract

Background: Traumatic Brain Injury, also known as intracranial injury is a significant public health problem and also a major leading cause of disability and mortality in all regions of the globe despite advancement in prevention and treatments.

Aims: To describe and evaluate the epidemiological and clinical characteristics of Traumatic Brain Injury patients and their clinical outcomes

Methodology: A hospital based Retrospective, cross-sectional study analysis of 900 patients diagnosed with Traumatic Brain Injury admitted to the Department of Neurosurgery, Geetanjali Medical College and Hospital, Udaipur from 1st November 2015 - 31st October 2016. Review of medical records of patients was done and data was collected according age, sex, mechanism of injury, severity of injury, Glasgow Coma Scale (GCS), Glasgow Coma Outcome (GOS) score, Computed Tomography (CT) scan results, modality of management and type of surgical intervention and outcome. The data were analyzed using SPSS version 20.

Results: Among the study subjects of 900 patients of TBI, majority were in age group of 20-29 (36.33%) years followed by 30-39 (26.11%) years and average (median) age of patients found to be 31 years. The most common mechanism of injury was road traffic accidents 70%. Clinical examination revealed that as a sign and symptom, 90.22% patients experienced loss of consciousness and 42.22% had one or more episodes of vomiting and 14.22% had abnormal motor response followed by 13.11% with abnormal pupils. Contusions (44.44%) and fractures (36.22%) were the most common findings revealed by CT scan. Thus CT scan revealed abnormal finding in about 86% patients and out of these patients 28% patients undergone for surgery and remaining was treated conservatively. In our study, patients were classified by GCS as mild TBI in 47.11%, moderate in 36.89% and severe in 16% patients. The overall mortality was 9%. In a 6 month follow-up, 3% patients were persistently vegetative, 1.78% was severely disabled and 1.22% was moderately disabled. Good recovery was seen in 85% patients.

Conclusion: In India, status of TBI suffers from several gaps which need to be bridged through implementing more basic, epidemiological, clinical and translational research in this field in the future.

Keywords: TBI, Epidemiology, Clinical, Glasgow Outcome Scale, Mortality.

Introduction

Traumatic Brain Injury is a major public health problem with the colossal burden on development

of country. In India every year there is an increase in number of patients with Traumatic Brain Injury both in urban and rural areas.¹⁻⁵ A study from

tertiary care institute has reported that the occurrence of TBI is approximately 42.5% in rural and 57.5% in urban area.⁶

Traumatic Brain Injury is the major cause of one-third to one-half of all deaths due to trauma and the leading cause of disability in people below age of 40, severely disabling 15–20 per lakh populations every year.⁷ According to World Health Organization, almost 90% of deaths due to injuries occur in low- and middle-income countries (LAMICs), where 85% of population live, and this situation will continue to represent an important global health problem in the upcoming years.^{8,9}

Traumatic Brain Injury is a leading cause of mortality, morbidity, disability, and socioeconomic losses in India. It is estimated that in our country nearly 1.5–2 million persons were injured, and 1 million die every year.¹⁰

Materials and Methods

The study is retrospective, cross-sectional, hospital based analysis consist of 900 patients with clinical/radiological evidence of traumatic brain injury admitted to the Department of Neurosurgery, Geetanjali Medical College and Hospital, Udaipur from 1st November 2015 - 31st October 2016. The study was approved by the Human Research Ethical Committee, Geetanjali Medical College and Hospital, Udaipur. Demographic profile of patients, type of injury, clinical analysis, radiological findings, and neurological analysis and management details was collected. Data was recorded in Microsoft Excel. Statistical analysis of the compiled data was analyzed using SPSS version 20 and presented in proportion and mean values. Proportions were analyzed using the Chi - Square test.

Injury was classified by the Glasgow Coma Scale (GCS) at the time of admission. TBI cases were graded as mild (13- 15), moderate (9-12) and severe (<8) on the basis of GCS. To know the final outcome Glasgow Outcome Scale was used. Long term outcome data was not available as

patients were lost on follow-up so data at 6 months data was collected.

Results

Among the sample of 900 patients with Traumatic Brain Injury, majority were of the group 20-29 years (36.33%) followed by 30-39 years (26.11%). It is thus observed that young and productive population are affecting mostly due to intracranial injury. Table 1

Male patients (64.89%) found to be in greater proportion as compared to female patients (35.11%). Majority of the patients were from urban area (55.44%) and 44.56% belonged to rural area. Majority of the patients were of middle class (45.33%) followed by lower (33.56%) and upper class (21.11%). Also majority of them were found to be in service (33.33%) followed by self (24.56%), others (21.11%) and business (20.44%). Table 2

Regarding mode of injury, Road traffic accidents (70%) found to be the most common followed by assault (14.67%) and falling from height (10.44%). Rests of the patients were injured due to falling of object on head (4.89%). It was also found that in 68% of RTA, patients were driving 2 wheeler and remaining 32% were found to be on other light and heavy vehicles. Table 3

Patients were evaluated on the basis of history and sign and symptoms. Glasgow coma scale was used to assess the seriousness of head injury and a total score of less than equal to 8 for 6 hrs was used to set the boundaries of patients and for measurement of mortality and morbidity GCS was used as initial end point at specified time of injury. For the study, patients were classified as mild (47.11%), moderate (36.89%) and severe (16%) according to GCS.

Loss of consciousness (90.22%) was found to be most common symptom in patients with Traumatic Brain Injury. Another symptom of vomiting was also found in 42.22% patients and other symptoms such as Vertigo (20.67%), ENT bleeding (17.11%) and history of seizures (15.56%) was also found. With the help of clinical

examination it was found that most common signs were Abnormal Motor response (14.22%) and Abnormal Pupil (13.11%). Other sign such as Abnormal Plantar response (10%), Cranial Nerve deficit (5.33%), Battle's sign (4.22%) and Raccoon eyes (3.33%) were also found. Table 4

All 900 patients with TBI went under CT scan at the time of admission and on the basis of GCS those who required the repetition of CT scan were went under in next 24 hours to assess the condition.

Most common finding revealed by CT scan were Contusions (44.44%), Fractures (36.22%) and Sub dual Hematoma (34.44%) followed by Pneumoc-ephalus (29.67%) and extra dual Hematoma (21%). Normal finding was revealed only in 15.89% patients. Thus overall it was observed that CT scan revealed abnormal findings in about 760(84%) patients. Out of those 760 patients, 213 (28%) were managed conservatively and remaining 547(72%) were managed surgically.

Table 4

Table 1: Age-wise distribution of patients with Traumatic Brain Injury

Age (yrs)	Number of Patients (%)
Less than 1	7 (0.78)
1-9	20 (2.22)
10-19	81 (9.00)
20-29	327 (36.33)
30-39	235 (26.11)
40-49	136 (15.11)
50-59	71 (7.89)
More than 60	23 (9.56)

Table 2: Demographic profile of Traumatic Brain Injury patients

Demographic Variables	Number of Patients (%)	
Genderwise	Male	584 (64.89)
	Female	316 (35.11)
Areawise	Rural	401 (44.56)
	Urban	499 (55.44)
Occupationwise	Service	300 (33.33)
	Business	184 (20.44)
	Self	221 (24.56)
	Others	195 (21.67)
Socio economic status	Upper Class	190 (21.11)
	Middle Class	408 (45.33)
	Lower Class	302 (33.56)

In this study, out of 900 patients mortality was found in 81 patients (9%) and out of those 81 patients 65 patients (80.25%) were in severe GCS category, 12 (14.81%) patients in moderate and 4 (4.94%) in mild GCS were expired due to other associated injuries such as compound fracture pelvis, Hemo-peritoneum, and blunt or perforating trauma chest. Table 5

In follow up period at 6 months, out of 900 patients, 27 were persistent vegetative and were usually on tracheostomy tube and aided by supportive care at home, 16 were in severe disability who were dependent on others for day to day activities and 11 in condition of moderate disability. Out of 900, 765 (85%) patients had good recovery and were healthy. Table 5

Thus it was found that increase in severity of TBI had significant association with mortality and every additional day of stay under medical observation has association with decrease in mortality.

Table 3: Mode of injury according to age

Age (in yrs)	MODE OF INJURY				Total (%)
	Road traffic accidents (%)	Assault (%)	Falling from height (%)	Falling of object on head (%)	
Less than 1	1 (0.16)	0	5 (5.32)	1 (2.27)	7 (0.78)
1-9	6 (0.95)	3 (2.27)	9 (9.57)	2 (4.55)	20 (2.22)
10-19	50 (7.94)	7 (5.30)	20 (21.28)	4 (9.09)	81 (9.00)
20-29	250 (39.68)	49 (37.12)	16 (17.02)	12 (27.27)	327 (36.33)
30-39	174 (27.62)	39 (29.55)	13 (13.83)	9 (20.45)	235 (26.11)
40-49	93 (14.76)	16 (12.12)	19 (20.21)	8 (18.18)	136 (15.11)
50-59	44 (6.98)	11 (8.33)	9 (9.57)	7 (15.91)	71 (7.89)
More than 60	12 (1.90)	7 (5.30)	3 (3.19)	1 (2.27)	23 (9.56)
Total (%)	630 (100) (70.00)	132 (100) (14.67)	94(100) (10.44)	44 (100) (4.89)	900 (100) (100)

Table 4: Clinical findings of patients

Clinical details of patients		Number of patients (%) N = 900
Sign	Abnormal motor response	128 (14.22)
	Abnormal pupil	118 (13.11)
	Abnormal plantar response	90 (10)
	Cranial Nerve deficit	48 (5.33)
	Battle’s sign	38 (4.22)
	Raccoon eyes	30 (3.33)
Symptoms	Loss of consciousness	812 (90.22)
	Vomiting	380 (42.22)
	Vertigo	186 (20.67)
	Ear Nose Throat bleeding	154 (17.11)
	History of Seizures	140 (15.56)
CT Scan findings	Contusion	400 (44.44)
	Fractures	326 (36.22)
	Sub dual Hematoma	310 (34.44)
	Pneumocephalus	267 (29.67)
	Extra dual Hematoma	189 (21.00)
	Normal	143 (15.89)
	Diffuse Axonal injury	136 (15.11)
	Sub Arachnoid Hemorrhage	102 (11.33)
Intra ventricular Hemorrhage	49 (5.44)	

Table 5: Glasgow Outcome Scale

Glasgow Outcome Scale - at 6 months		Glasgow Coma Scale Severity			Total (%)
		Mild (%)	Moderate (%)	Severe (%)	
GOS 1	Good recovery	420 (54.90)	317 (41.44)	28 (3.66)	765 (100)
GOS 2	Moderate disability	0	1 (9.09)	10 (90.91)	11 (100)
GOS 3	Severe disability	0	1 (6.25)	15 (93.75)	16 (100)
GOS 4	Persistent vegetative	0	1 (3.70)	26 (96.30)	27 (100)
GOS 5	Death	4 (4.94%)	12 (14.81)	65 (80.25)	81 (100)
Total (%)		424 (47.11)	332 (36.89)	144 (16.0)	900 (100)

Discussion

In the present study it was observed that mostly young and productive population from urban area is getting affected due to Intracranial injury and majority of patients were males which is close to the IMPACT study (2007) according to which TBI case are dependent on age,¹¹ and study of

M.K.Goyal, et al. (2010)¹² also concluded in his study that most affecting age group to be 21-40 years a and 66% were males.

Road traffic accidents (70%) was found to be the major common mode of injury which is close to the similar finding i.e. 65.73% in the study of A.Pathak, et al. (2008)¹³ but in contrast that study

not found assault to be the another major mode of injury which was found in our study i.e. 1.6% in Pathak's study and 14.67% in this study.

M.K.Goyal (2010)¹² in his study concluded that CT scan revealed abnormal findings in 82% patients where this study found it to be in 86% patients which are close.

Mock.et al (2003)¹⁴ also concluded in his study that good recovery was seen in majority of trauma patients which close to the finding of this study (85%).

Conclusion

Traumatic Brain Injury is a one of the major health issue that imposes serious threats and medical concerns to public health which is very alarming and highlighting the need for taking urgent steps for establishing good pre-hospital care and provision of trauma services at site in India.

Road traffic accidents are the major cause of TBI affecting mostly young adult males. Mortality is 9% with the majority of deaths occurring among persons in productive age groups. Good recovery was observed in approximately 85% of cases in this study. Good neurosurgical care, computerized trauma registration is required to bring out the risk factors, circumstances, chain of events leading to the accidents and will be extremely helpful in policy making and health management at the national level in India.

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