ISSN (Print): 2617-0817 ISSN (Online): 2789-5912

Original Article

Role of Conservative Management in Traumatic Brain Injury Patients in Tertiary Level Hospital

DOI: dx.doi.org

Md. Tofael Hossain Bhuiyan[1], Rajkumar Roy[2], Mst. Shamima Sultana[3], Md. Habibur Rahman[3], Md. Zahidul Islam[4], Md. Mahbubul Islam[5], Md. Taifur Rahaman[6]

Received: 08 Aug 2022
Accepted: 13 Aug 2022
Published: 15 Aug 2022

Published by:
Sher-E-Bangla Medical College, Barishal

ABSTRACT

Background: *Traumatic brain injuries are a major cause of morbidity and mortality in modern times and it is a huge health sector burden. Understanding the mechanism of traumatic brain injury leads to the development of guidelines for the management of traumatic brain injury.* ***Objective:*** *The general objective of this study was to investigating the role of conservative management for treating traumatic brain injury (TBI) in Bangladesh.* ***Method:*** *Data were collected from non-operated cases of traumatic brain injury. Total number of samples were 300. Duration of this study was 6 months from date of approval. The nature of the study was a prospective observational study.* ***Result:*** *Mean and Std. Deviation of age of the patients was 33.8653± 16.72 years, maximum 49% patients age between 26 to 50 years, 83.3% patients were male and 16.7% patients were female. Average hospital stay was 3.12 days. There was no significant relationship between age groups and Since events of injury to RpMCH. There was positive relationship between age group and mode of injury such as Assault and RTA but p value was 0.067 which was not statistically significant. The association of CT findings with vomiting, headache, vertigo. P value was statistically significant in vomiting and vertigo but not significant in headache.* ***Conclusion:*** *Radiologically significant EDH, SDH, SAH, Skull fracture contusion and Cerebral Oedema can be treated conservatively which depends on the neurological state of the patients rather than the size of lesion. When conservative treatment is considered, adequate neuro observation is mandatory.*

Keywords: *TBI, CT and MRI (MRIs), Advanced Trauma Life Support (ATLS), ICP*

(The Planet 2022; 6(1): 75-85)

1. *Professor and Head (Neurosurgery), Rangpur Medical College Hospital, Rangpur, Bangladesh*
2. *Associate Professor (Neurosurgery), Rangpur Medical College Hospital, Rangpur, Bangladesh*
3. *Assistant Professor (Neurosurgery), Rangpur Medical College Hospital, Rangpur, Bangladesh*
4. *Associate Professor (Orthopedic Surgery), Rangpur Medical College Hospital, Rangpur, Bangladesh*
5. *Assistant Professor (Community Medicine), Rangpur Medical College Hospital, Rangpur, Bangladesh.*
6. *Assistant Professor (Anesthesiology), Rangpur Medical College Hospital, Rangpur, Bangladesh*

INTRODUCTION

A traumatic brain injury (TBI), also known as an intracranial injury, is an injury to the brain caused by an external force. TBI can be classified based on severity (ranging from mild traumatic brain injury to severe traumatic brain injury), mechanism (closed or penetrating head injury), or other features (e.g., occurring in a specific location or over a widespread area).[1] Head injury is a broader category that may involve damage to other structures such as the scalp and skull. TBI can result in physical, cognitive, social, emotional and behavioral symptoms, and outcomes can range from complete recovery to permanent disability or death.[2] Causes include falls, vehicle collisions and violence. Brain trauma occurs as a consequence of a sudden acceleration or deceleration within the cranium or by a complex combination of both movement and sudden impact. In addition to the damage caused at the moment of injury, a variety of events following the injury may result in further injury. These processes include alterations in cerebral blood flow and cerebral perfusion pressure within the skull. Some of the imaging techniquesused for diagnosis include computed tomography (CT) and magnetic resonance imaging (MRIs).[3]

Prevention measures include use of seat belts and helmets, no drinking during driving, fall prevention efforts in older adults and safety measures for children.[4] Depending on the injury, treatment required may be minimal or may include interventions such as medications, emergency surgery or surgery years later. Physical therapy, speech therapy, recreation therapy, occupational therapy and vision therapy may be employed for rehabilitation. Counseling, supported employment and community support services may also be useful.

TBI is a major cause of death and disability worldwide, especially in children and young adults.[5]Males sustain traumatic brain injuries around twice as often as females.[6] The 20th century saw developments in diagnosis and treatment that decreased death rates and improved outcomes. The initial management of patients with TBI is identical to that of all trauma patients, focusing on the Advanced Trauma Life Support (ATLS) principles of management of airway, breathing, and circulation, followed by a rapid neurologic exam and exposure of the patient with prevention of hypothermia.[7]

The airway should be secured according to local protocols. Induction agents such as propofol should be carefully used, possibly in conjunction with induction inotropes, given the risk of systemic hypotension with impaired CBF. Ketamine is an effective agent in trauma patients given its favorable hemodynamic profile. Despite theoretical risks, a systematic review of ketamine use in TBI suggests that ketamine does not increase ICP15.[8] Breathing should be optimized to maintain oxygenation and prevent ventilator dysfunction.[9] Hyperventilation is used by some providers to acutely decrease ICP through hypocarbic vasoconstriction, despite evidence showing an association between even brief periods of hyperventilation and increased mediators of secondary brain injury in areas adjacent to injured brain tissue as well as local reductions in cerebral perfusion.[10] This strategy should be used with caution, and perhaps only employed to acutely combat signs of active herniation while initiating more definitive treatment. In the conservative treatment of head injuries, we have found need for certain immediate measures for the control of shock, hemorrhage, edema, and brain damage. These measures may be continued for a short time or in cases of prolonged unconsciousness must be continued for a longer period. Shock is the first and most important factor to control. After shock symptoms have subsided and hemorrhage and edema are under control one must make a careful survey toascertain

what damage has been done to the brain, meninges and spinal cord, and other organsand viscera.[10]

OBJECTIVES

General Objective:

The general objective of this study was to investigate the role of conservative management for treating traumatic brain injury (TBI) in Bangladesh.

Specific Objectives:

Specific objectives of the proposed research will be as follows:

- To evaluate the prevalence of TBI patients.
- Identify socio-demographic status of TBI patients;
- To assess the clinical profile of TBI parents;
- To assess the outcome of conservative treatment among TBI patients.

METHODOLOGY

Study design:

The nature of the study was a prospective observational study. Both qualitative and quantitative (Mix Method) were applied to find out best possible outcome.

Source of Data:

Data were collected from non-operated cases of traumatic brain injury were enrolled inthe study.

Place of study:

The study will be carried out at tertiary medical college and hospital.

Period of study:

6 months from date of approval.

Sampling method:

Purposive sampling methods were applied for the study.

Data collection technique:

Subjects were selected conveniently according to inclusion and exclusion criteria and availability of cases. Detailed history and clinical information were obtained by performing structured questionnaire and clinical records.

Study procedure:

After obtaining informant consent this prospective study will be conducted among the TBI patients. Socio-demographic information and clinical history was recorded in a predesigned data sheet.

DATA PRESENTATION AND ANALYSIS:

Statistical analysis was performed using the Statistical Package for Social Sciences SPSS 23 and Excel software. The results of the study will be presented in tables, figures and diagrams. The descriptive statistics of the study will be presented in tables, figures or suitable graphs, mean ± SD as per the requirement of qualitative and quantitative variables. Mean comparison between two groups will be done by Student's t-test<0.05 will be considered as statistically significant.

RESULTS

Table 1 showed that the Mean and Std. Deviation of age of the patients was 33.8653±16.72 years. Here the minimum age was 2 years and maximum age was 85 years.

Table-1: Age distribution of the patients (N=300)

Age Distribution					
	N	Minimum	Maximum	Mean	Std. Deviation
Age in Years	300	2.00	85.00	33.8653	16.72068

Table 2 showed the age group and sex group among the patients. Here maximum 49% patients age between 26 to 50 years. Besides, in age group 83.3% patients were male and 16.7% patients were female. This result indicates that TBI prevalence is

higher in working age group and male. Table 3 demonstrated that the mean of hospital stay was 3.12 days. Table 4 showed that there is no significant relationship between age groups and since events of injury to RpMCH.

Table-2: Distribution of age and sex group among the patients (N=300)

Variable Names	Frequency (N)	Percentage	Valid Percentage	Cumulative Percentage
Age Group				
1 to 25 Years	115	38.3	38.3	**38.3**
26 to 50 Years	147	49.0	49.0	**87.3**
51 to 75 Years	35	11.7	11.7	**99.0**
>75 Years	3	1	1	**100.0**
Total	300	100	100	
Sex Group				
Male	250	83.3	83.3	**83.3**
Female	50	16.7	16.7	**100**
Total	**300**	**100**	**100**	

Table-3: Distribution of Hospital Stay Among the patients. (N=300)

Descriptive Statistics					
	N	Minimum	Maximum	Mean	**Std. Deviation**
Hospital Stay	**300**	**0**	**21**	**3.12**	**3.343**

Table-4: Compare age group and since events of injury to RpMCH (N=300)

Age Group	Since events of injury to RpMCH			Total	p value
	<6 Hours	<24 Hours	>24 Hours		
1 to 25 Years	95	14	6	115	**0.771**
	31.6%	4.7%	2.1%	38.3%	
26 to 50 Years	123	13	11	147	
	41.0%	4.3%	3.8%	49%	
51 to 75 Years	25	7	3	35	
	8.3%	2.7%	1.0%	11.7%	
>75 Years	3	0	0	3	
	1.0%	0.0%	0.0%	1.0%	
Total	246	34	20	300	
	81.9%	**11.3%**	**6.8%**	**100.0%**	

Note: p value calculated by Chi-squared tests

Table-5 showed that here is the positive relationship between age group and mode of injury such as Assault and RTA but p value was 0.067 which was not statistically significant.

Table-5: Compare between age group and since mode of injury (N=300)

Age Group	Mode of injury		Total	P value
	Assault	RTA		
1 to 25 Years	7	101	108	**0.067**
	12.73%	41.2%	36%	
26 to 50 Years	34	113	147	
	61.82%	46.1%	49%	
51 to 75 Years	14	28	42	
	25.45 %	11.4%	14%	
>75 Years	0	3	3	
	0.0 %	1.2%	1%	
Total	55	245	300	
	100.0%	**100.0 %**	**100.0%**	

Note: P value calculated by Chi-squared tests

Table-6: Clinical presentation on admission of headache, vomiting and vertigo (N=300)

Clinical Presentationon admission	Headache		p Value	Vomiting		p Value	Vertigo		p Value
	Yes	No		Yes	No		Yes	No	
Yes	153 (54.6 %)	127 (45.4 %)	0.642	145 (51.79 %)	135 (48.21 %)	0.006	74 (26.4 %)	206 (73.6 %)	0.889
No	12 (60%)	8 (40%)		4 (20%)	16 (80%)		5 (25%)	15 (75%)	

Table-6 showed that here is the positive relationship between clinical presentation on admission of headache, vomiting and vertigo. p value of clinical presentation on admission of headache was 0.642 which was not statistically significant, p value of clinical presentation on admission of vomiting was 0.006 which was statistically significant and p value of clinical presentation of admission of vertigo was 0.889 which was statistically not significant.

Table-7: Clinical presentation on discharge of headache, vomiting and vertigo (n=300)

Clinical Presentationon discharge	Headache		P Value	Vomiting		P Value	Vertigo		P Value
	Yes	No	0.813	Yes	No	0.003	Yes	No	.438
Yes	7 (58.3 %)	5 (41.1%)		1 (8.3 %)	11 (91.7%)		2 (16.7 %)	10 (83.3 %)	
No	**158 (54.9 %)**	**130 (45.1%)**		**148 (51.39 %)**	**140 (48.61 %)**		**77 (26.7 %)**	**211 (73.3 %)**	

Table-7 o showed that here is the positive relationship between clinical presentation on discharge of headache, vomiting and vertigo. p value of clinical presentation on discharge of headache was 0.813 which was not statistically significant, p value of clinical presentation on discharge of vomiting was 0.003 which was statistically significant and p value of clinical presentation on discharge of vertigo was.438 which was statistically not significant.

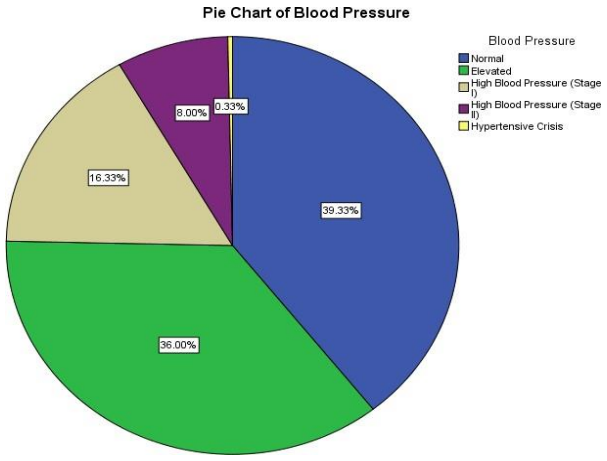

Figure-1: Pie chart of blood pressure among the TBI patients.

Figure 1 showed that most of the patients (39.33%) blood pressure was normal.

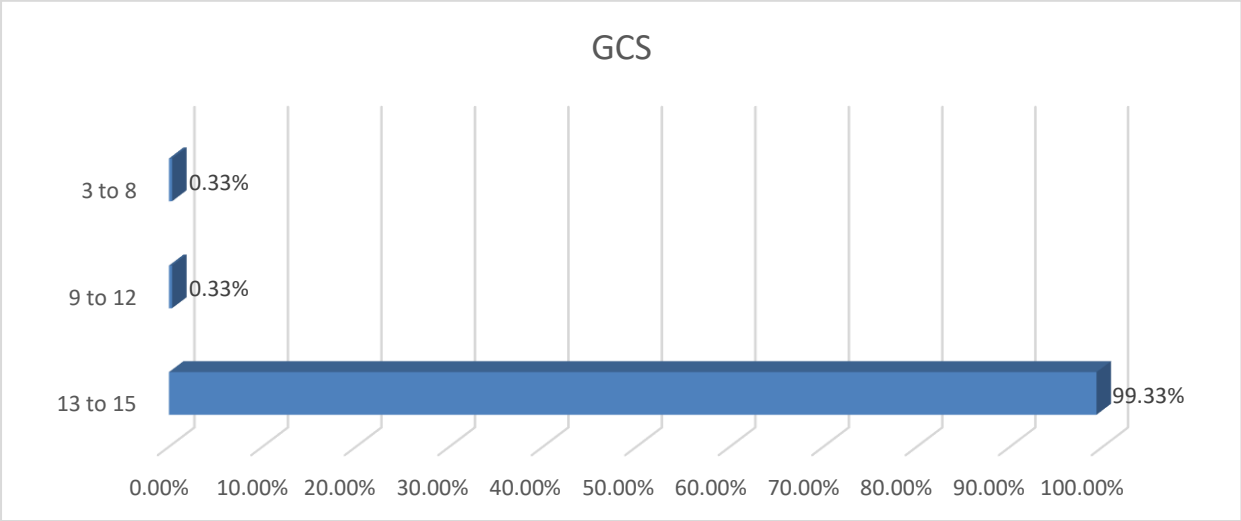

Figure-2: GCS score of the TBI patient

Figure-2 shows the GCS score of the TBI patients and except 02 patients all GCS score wasbetween 13 to 15.

Table-8: Distribution of pulse rate among the patients (N=300)

Pulse Rate among the patients					
	N	Minimum	Maximum	Mean	**Std. Deviation**
Pulse	**300**	**60**	**120**	**77.96**	**7.220**

Table-8 showed that the average pulse rate among the patients was 77.96.

Table-9: Distribution of CT findings (N=300)

CT Scan Findings					
		Frequency	Percent	Valid Percent	**Cumulative Percent**
Valid	EDH	19	6.3	6.3	**6.3**
	EDH, ICH/Hg contusion	5	1.7	1.7	**8.0**
	EDH, SAH	1	.3	.3	**8.3**
	EDH, SAH, ICH/Hg contusion	1	.3	.3	**8.7**
	EDH,ICH/hg contusion	1	.3	.3	**9.0**
	ICH/Hg contusion	12	4.0	4.0	**13.0**
	normal brain	200	66.7	66.7	**79.7**
	normal brain, EDH	11	3.7	3.7	**83.3**

	normal brain, EDH, ICH/Hg cont	1	.3	.3	**83.7**
	normal brain, ICH/Hg contusion	1	.3	.3	**84.0**
	normal brain, skull fracture	6	2.0	2.0	**86.0**
	SAH	1	.3	.3	**86.3**
	SAH, ICH/Hg contusion	3	1.0	1.0	**87.3**
	SDH	7	2.3	2.3	**89.7**
	SDH, SAH	1	.3	.3	**90.0**
	skull fracture	1	.3	.3	**90.3**
	skull fracture, EDH	7	2.3	2.3	**92.7**
	skull fracture, EDH, ICH/Hg co	6	2.0	2.0	**94.7**
	skull fracture, EDH, SDH	**1**	**.3**	**.3**	**95.0**

Table-10: Association of CT finding with vomiting, headache, vertigo

CT Scan Findings	**Vomiting**		**P value**	**Headache**		**P value**	**Vertigo**		**P value**
	Yes	No		Yes	No		Yes	No	
EDH	14	5	0.007	8	11	.535	8	11	**0.010**
	73.7%	26.3%		42.1%	57.9%		42.1%	57.9%	
EDH, ICH/Hg contusion	4	1		3	2		1	4	
	80.0%	20.0%		60%	40%		20.0%	80.0%	
EDH, SAH	0	1		0	1		0	1	
	0.0%	100.0%		0.0%	100%		0.0%	100.0%	
EDH,	1	0		1	0		0	1	

SAH, ICH/ Hg contusion	100.0%	0.0 %		100 %	0.0 %		0.0 %	100.0%
EDH,ICH/hg contusion	0	1		1	0		1	0
	0.0 %	100.0%		100 %	0%		100.0%	0.0 %
ICH/ Hg contusion	7	5		3	9		1	11
	58.3 %	41.7 %		25 %	75 %		8.3 %	91.7 %
normal brain	81	118		114	86		42	158
	40.7 %	59.3 %		57.0 %	43.0%		21.0 %	79.0 %
normal brain, EDH	6	5		7	4		5	6
	54.5 %	45.5 %		63.6 %	36.4%		45.5 %	54.5 %
normal brain, EDH, ICH/Hg cont	1	0		1	0		1	0
	100.0%	0.0 %		100 %	0%		100.0%	0.0 %
normal brain, ICH/ Hg contusion	0	1		0	1		0	1
	0.0 %	100.0%		0.0 %	100 %		0.0 %	100.0%
normal brain, skull fracture	4	2		3	3		2	4
	66.7 %	33.3 %		50 %	50 %		33.3 %	66.7 %
SAH	0	1		0	1		0	1
	0.0 %	100.0%		100 %	0%		0.0 %	100.0%
	1	**2**		**1**	**2**		**2**	**1**

Table-10 shows the association of CT findings with vomiting, headache, vertigo. P value was statistically significant in vomiting and vertigo but not significant in headache.

DISCUSSION

In this prospective observational study where 300 records of patients having TBI at RPMCH were examined for 3 months' period. As per the study findings sex distribution did not have any specific impact on outcome of TBI patients but it is important to note that majority of TBI affected population were male. TBI continues to be a nightmare for both the public as well asfor the neurosurgeons due to associated high morbidity and mortality.

It is also associated with significant socioeconomic losses in developing countries including Bangladesh. In a study from central India reported mean age of TBI cases were 32-64 years. In our study the Mean and Std. Deviation of age of the patients was 33.8653± 16.72 years. Male: Female ratio was 6:1. Similar observation of male predominance was noted by many other authors also. The probable reason may be that the male population move out of their home more frequently for work. No correlation of sex with treatment outcome is noted in present study. Our observation corresponds with those made by other studies. The reason is that the mobility of male population is higher than their female counter part and they are exposed to more accidental risk factors at various places. As per cause of injury we noted significant relation with outcome. Most common mode of injury was RTI and fall. Injuries other than assaulted showed good outcome as they have different mechanism of action. The IMPACT study has concluded that outcome in TBI cases are dependent on age, but in our study outcome remained to be closely related with the impact of primary injury as shown by the initial GCS. Pre-hospital care is very necessary for the stabilization of trauma cases in term of adequate airway protection, prevention of excess blood loss and subsequent trauma during transportation to proper hospital setup for definitive care. There is need to create awareness among public regarding how to provide initial care to a trauma patient and need of well-trained paramedics on ambulances placed at various strategic location in the city for swift action. In our study hospitalization within one day was 98% case is related to outcome of TBI. In 1978 it was suggested that the GCS be used to assess the seriousness of head injury. A total GCS score of 8 or less for 6 hours be used to set the boundaries of patient study groups and that the GCS be used as the initial end point at a specified time from injury for measuring morbidity and mortality. In the present study good outcome was noted in mild, moderate and severe grades of TBI according to mean hospital stay. Therefore it becomes clear that there is a progressive decrease in good outcome as severity of TBI increases based on GCS. Nutritional support is an integral, though often neglected component of the care of critically injured patient. Nutritional demand in patients with severe TBI is increased due to hypermetabolism and increased protein catabolism. In another study 48% of patient start orally within one day of hospital admission. Therefore it become clear that outcome of TBI related with early as possible to start orally. On CT scan, brain contusion and oedema was noted in 64% and 62% respectively, EDH,SDH and SAH was noted in 41%,39% and 52% respectively, MIDLINE SHIFT was noted in 28% cases of TBI. Follow up CT brain was done which patients not improve according to GCS with conservative management. McLaurin and Towbin mentioned in 1989 that the definitive treatment of EDH should always be surgical removal and delay of this treatment is unacceptable once the diagnosis has been established.[11]

CONCLUSION

By improving the system with better reporting and documentation of cases, it will be able to make a better plan to decrease the incidence of TBI and their timely appropriate multimodality approaches to achieve better outcome of these cases within our limited resources. TBI predominantly affects young male population and most of these are preventable. Early transportation to the hospital and first aid results in good outcome. Mortality increases with the severity of TBI and associated injuries therefore multimodality approach in polytrauma is essential. Radiologically significant EDH, SDH, SAH, Skull fracture contusion and Cerebral Oedema can be treated conservatively. This

depends on the neurological state of the patients rather than the size of lesion. When conservative treatment is considered, adequate neuro observation is mandatory.

REFERENCES

1. *Jones, Derek K. (2010). Diffusion MRI. Oxford University Press. p. 25. ISBN 978-0-19- 970870-3.*
2. *Rehman T, Ali R, Tawil I, Yonas H (2008). "Rapid progression of traumatic bifrontal contusions to transtentorial herniation: A case report". Cases Journal. 1 (1): 203. doi:10.1186/1757-1626-1-203. PMC 2566562. PMID 18831756.*
3. *TBI: Get the Facts". CDC. March 11, 2019. Retrieved May 28, 2019.*
4. *Traumatic Brain Injury". medlineplus.gov. Retrieved May 28, 2019.*
5. *Basic Information about Traumatic Brain Injury | Concussion | Traumatic Brain Injury | CDC Injury Center". www.cdc.gov. March 6, 2019. Retrieved July 21, 2020.*
6. *Prevention". CDC. March 4, 2019. Retrieved May 28, 2019.*
7. *Alves OL, Bullock R (2001). "Excitotoxic damage in traumatic brain injury". In Clark RS, Kochanek P (eds.). Brain injury. Boston: Kluwer Academic Publishers. p. 1. ISBN 978-0- 7923-7532-6.*
8. *Rao V, Lyketsos C (2000). "Neuropsychiatric sequelae of traumatic brain Injury".Psychosomatics. 41 (2): 95–103. doi:10.1176/appi.psy.41.2.95. PMID 10749946.*
9. *Maas AI, Stocchetti N, Bullock R (August 2008). "Moderate and severe traumatic brain injury in adults". Lancet Neurology. 7 (8): 728–41. doi:10.1016/S1474-4422(08)70164-9. PMID 18635021. S2CID 14071224.*
10. *Parikh S, Koch M, Narayan RK (2007). "Traumatic brain injury". International Anesthesiology Clinics. 45 (3): 119–3.*
11. *Jignesh P Dave et al. A study of cases of conservative treatment of head injury. MedPulse International Journal of Surgery. December 2019; 12(3): 116-120. https://www.medpulse.in/Surgery/*