

1A descriptive study to assess the Cognitive, Behavioral, and Functional Impairments among patients with Traumatic Brain Injury at selected hospitals, Coimbatore.

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Abstract

Introduction: Traumatic brain injury (TBI) is a leading cause of death and disability worldwide. The World Health Organization (WHO) projected that road traffic injuries will rise from currently being the ninth leading cause of death globally to become the fifth by 2030 (WHO, 2008)

Objective: The objectives of the study were to assess cognitive, behavioral, and functional impairments in patients of TBI.

Materials and Methods A descriptive study was conducted using purposive sampling technique. Mini- mental status examination, neuropsychiatric inventory and Rappaport's disability rating scale were used to assess patients' cognitive, behavioral, and functional impairments

Conclusion: Patients develop cognitive, behavioral, and functional disability after TBI. The caregiver burden increases significantly with cognitive dysfunction, behavioral symptoms, and impaired functional status of patients. Therefore, appropriate support is to be provided to caregivers as well as patients.

Keywords Traumatic brain injury, Disability Rating Scale, Behavioral Changes, Outpatient Department, Rappaport Disability Rating Scale

Introduction: Globally, the annual incidence of TBI is variably estimated at 27 to 69 million [1,2]. Many survivors live with significant disabilities, resulting in major socioeconomic burden. Traumatic brain injury (TBI) is a leading cause of disability, creating a huge burden on individuals and society.¹ Over half of patients presenting with mild TBI report limitations in function at 6 months,² and disability may persist for many years.³ Despite a high prevalence, much of this disability is unexplained, representing a barrier to effective treatment.⁴ Studies show that cognitive test performance is associated with aspects of function in daily life after TBI, including independence and return to work.^{5,6} However, the relationship between cognitive impairment and everyday functioning is incompletely understood.

Materials and Methods: We have conducted a descriptive study by means of purposive sampling method on 30 TBI survivors and their caregivers attending the Neurosurgery outpatient department in Sri Ramakrishna hospital during the period of 3 months with data collection from May to July 2022. We have obtained ethical clearance from the Institute Ethics Committee. All adult patients suffering from TBI were recruited from 3 months to 2 years after the initial TBI. Patients with a Glasgow Coma Scale (GCS) score of 14 to 15 on their outpatient department. Consent was taken from conscious patients (GCS 15) and caregivers after explaining the objectives of the study and the confidentiality of the data was ensured.

Demographic and clinical profiles of the TBI survivors are presented in **Table 1**. Out of 30 patients 40% of them belong to the age group of 41-60 yrs, majority of the patients were male. 53.33 % of the patients were belong to the duration of 3- 6 months, 70 % of them were

having moderate level of consciousness with GCS of Moderate (9–12).

Tab: 1 demographic variables of patient with TBI

n-30

Variable	Characteristics of patients	Frequenc y	Percentag e
Age	Up to 40	7	23.33
	41–60	12	40
	>60	11	36.66
Gender	Male	17	56.66
	Female	13	43.33
Marital status	Unmarried	18	60
	Married	12	40
Educational status	Illiterate	10	33.33
	Up to 10	7	23.33
	Senior secondary	6	20
	Graduate	7	23.33
Occupation	employed	22	73.33
	Unemployed	8	26.66
Duration since TBI	3 to 6 mo	16	53.33
	6 mo to 1 y	10	33.33
	>1 y	4	13.33
Mode of injury	Fall from height	7	23.33
	Road traffic accident	21	70
	Violence	2	6.66
GCS	Mild (13–15)	5	16.66
	Moderate (9–12)	21	70
	Severe (3–8)	4	13.33

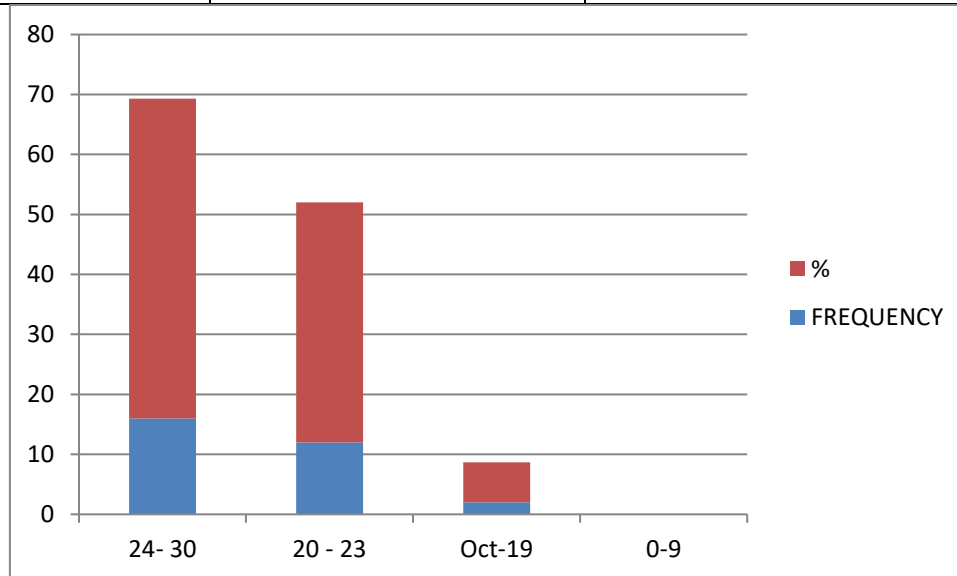
Cognitive Dysfunction of Patients with TBI

As per literature, cognitive, behavioral, emotional, and physical impairment is common in patients of TBI. The cognitive and behavioral impairments could be due to the sequelae of the complex cascade of microvascular ischemia, proportional to the severity of TBI.^{3,14,15,16} The damage to the key pathways of cognitive function due to white matter damage is vastly related to cognitive impairment in patients of TBI.³³ Cognitive dysfunction based on the MMSE score of the patients is shown in **Fig. 2**. Out of 30 patients, 53.33% of the patients were found to have normal cognition (MMSE score 24–30), but 40% had moderate, and 6% had mild cognitive dysfunction.

Fig 2: cognitive dysfunction of patients with TBI

n = 30

score	frequency	percentage %
24- 30	16	53.33
20 - 23	12	40
Oct-19	2	6.66
0-9	0	0



Behavioral Symptoms of Patients with TBI

In the present study, common behavioral changes present in the patients of TBI included agitation, appetite and eating disorders, depression, anxiety, and irritability. As compared with 14% reported by de Guise et al, agitation was found in 40% of our patients.

Disinhibition was reported by 4% of our patients which was in line with 10% reported in literature.²⁵ Depressive symptoms such as dysphoria, anxiety, and irritability were present in approximately 20% of the patients as compared with 25 to 40% of the patients reported in the literature.^{9,13} Prevalence of behavioral symptoms up to 80% is reported in patients recovered after severe TBI.⁹ Patients of TBI may suffer from persistent behavioral problem that prolongs to later period of life.⁹ Similarly, a decline in behavioral status is seen as compared with the preinjury state in social integration, productivity, and home instigations. Approximately one-fourth of the patients suffer from social and emotional problems.²⁷⁻²⁹

Behavioral symptoms of patients with TBI based on NPI-Q are depicted in Fig. 2. Out of 50 patients, 30% had agitation, 22% had appetite disturbance, 14% had symptoms of depression, 8% had anxiety, and 6% had irritability. None of the patients had hallucination. Very few patients had problems of elation, apathy, disinhibition, irritability, and motor disturbances a partial type of disability. Only 2% of the patients had a mild and severe type of disability.

Functional Impairment/Status of the Patients with TBI

The functional status of patients based on the DRS score (rapport disability rating scale of the patients). Out of 30 patients, 58 % of the patients did not have any disability, but 22% had moderately severe, 8% had moderate, and 6% had a partial type of disability. Only 6 % of the patients had a mild and severe type of disability.

CONCLUSION: TBI survivors do suffer cognitive, behavioral, and functional dysfunctions after injury. During the provision of care, care-givers suffer the burden of different levels. Nurses or other health personals can be of ideal support by providing maximum aid and help by being guides, counselors, and health educators to both patients as well as caregivers. Further studies are required to arrive at the evidence based treatment protocol for cognitively impaired persons due to TBI. In a developing country like India, focus should be directed toward rehabilitation interventions that are not only effective and easily applicable but are also low cost. Increasing public awareness and attention will lead to further research and better advocacy.

References:

- [1] Taylor CA, Bell JM, Breiding MJ, Xu L. Traumatic Brain Injury– Related Emergency Department Visits, Hospitalizations, and Deaths — United States, 2007 and 2013. *MMWR Surveill Summ* 2017;66:1–16. 2.
- [2] Maas AIR, Menon DK, Adelson PD, *et al*. Traumatic brain injury: integrated approaches to improve prevention, clinical care, and research. *The Lancet Neurology* 2017;16:987–1048. doi:10.1016/S1474-4422(17)30371-X [Google Scholar](#)
- [3] Nelson LD, Temkin NR, Dikmen S, *et al*. Recovery after mild traumatic brain injury in patients presenting to US level I trauma centers: a transforming research and clinical knowledge in traumatic brain injury (TRACK-TBI) study. *JAMA Neurol* 2019. [Google Scholar](#)
- [4] Wilson L, Stewart W, Dams-O'Connor K, *et al*. The chronic and evolving neurological consequences of traumatic brain injury. *The Lancet Neurology* 2017;16:813–25. doi:10.1016/S1474-4422(17)30279-X
- [5] Dhandapani SS, Manju D, Mahapatra AK. The economic divide in outcome following severe head injury. *Asian J Neurosurg* 2012;7(1):17–20
- [6] Dhandapani M, Gupta S, Mohanty M, Gupta SK, Dhandapani S. Prevalence and trends in the neuropsychological burden of patients having intracranial tumors with respect to neurosurgical intervention. *Ann Neurosci* 2017;24(2):105–110
- [7] Neumann D, Lequerica A. Cognitive problems after traumatic brain injury. *Arch Phys Med Rehabil* 2015;96(1):179–180
- [8] Pinquart M, Sörensen S. Associations of caregiver stressors and uplifts with subjective well-being and depressive mood: a meta-analytic comparison. *Aging Ment Health* 2004;8(5):438–449
- [9] Dhandapani S, Bajaj A, Gendle C, *et al*. Independent impact of plasma homocysteine levels on neurological outcome following head injury. *Neurosurg Rev* 2018;41(2):513–517
- [10] Sherwood PR, Given BA, Doorenbos AZ, Given CW. Forgotten voices: lessons from bereaved caregivers of persons with a brain tumour. *Int J Palliat Nurs* 2004;10(2):67–75, discussion 75
- [11] Rivera P, Elliott TR, Berry JW, Grant JS, Oswald K. Predictors of caregiver depression among community-residing families living with traumatic brain injury.

NeuroRehabilitation 2007;22(1):3-8

- [12] arsh NV, Kersel DA, Havill JA, Sleigh JW. Caregiver burden during the year following severe traumatic brain injury. *J Clin Exp Neuropsychol* 2002;24(4):434-447
- [13] Dhandapani M, Gupta S, Mohanty M, Gupta SK, Dhandapani S. Trends in cognitive dysfunction following surgery for intracranial tumors. *Surg Neurol Int* 2016;7(suppl 7):S190-S195
- [14] Thakur D, Dhandapani M, Ghai S, Mohanty M, Dhandapani S. Intracranial tumors: a nurse-led intervention for educating and supporting patients and their caregivers. *Clin J Oncol Nurs* 2019;23(3):315-323
- [15] Kreutzer JS, Seel RT, Gourley E. The prevalence and symptom rates of depression after traumatic brain injury: a comprehensive examination. *Brain Inj* 2001;15(7):563-57
- [16] Shamkhy, Dr Mahmood Swady, And Dr Mazin Mohammad Jawad Al-Mussawy. "Outcome Analysis And Outcome Prognostic Factors Of Traumatic Brain Injury In Childhood." *International Journal Of Medicine And Pharmaceutical Science (Ijmeps)* 9 (2019): 35-48.
- [17] Debbarma, Shibajee, Et Al. "Epidemiology Of Accident Cases Attending A Tertiary Care Hospital In Kanpur." *International Journal Of Medicine And Pharmaceutical Sciences (Ijmeps)* 6.1 (2016): 125-130.
- [18] Saxena, Sumanlata, Rajat Kumar Jain, And Hement Kumar Jain. "Impact Of Cognitive Style On Problem Solving Ability Among Undergraduates." *International Journal Of Academic Research In Psychology* 1.1 (2014): 6-10.
- [19] Radhika, Sivvala, And V. Kavitha Kiran. "Cognitive Development Of Children With Learning Disabilities: An Intervention Study." *International Journal Of Educational Science And Research (Ijesr)* 7.4 (2017): 53-60.
- [20] Shamkhy, Dr Mahmood Swady, And Dr Mazin Mohammad Jawad Al-Mussawy. "Outcome Analysis And Outcome Prognostic Factors Of Traumatic Brain Injury In Childhood." *International Journal Of Medicine And Pharmaceutical Science (Ijmeps)* 9 (2019): 35-48.
- [21] Kumar, Navneet, Tanu Midha, And Yashwant Kumar Rao. "Determinants Of Epilepsy In Children And Adolescents (6-19 Years) In A Tertiary Care Hospital In Kanpur." *International Journal Of Medicine And Pharmaceutical Science (Ijmeps)* 8.1 (2018): 53-58.