GAP INDIAN JOURNAL
OF FORENSICS AND BEHAVIOURAL SCIENCES
(ISSN – 2582-8177)
Globally peer-reviewed and open access journal.

DOES HEAD INJURY LEAD TO COGNITIVE DETERIORATION

Kunzes Dolma, Prerna Sharma

Clinical Psychologist, Janakpuri Super Specialty Hospital, New Delhi

Assistant Professor, AIBHAS, Amity University Uttar Pradesh, Noida Campus

Abstract

Background: *After any traumatic injury to brain, the brain doesn't heal completely and that's why some effects will be permanent leading to loss in cognitive function, behavior and emotions. The Aim is to study the cognitive functioning and evaluate the extent of cognitive loss in patients with Traumatic Brain injury.* ***Methodology:*** *A sample of 50 out-patients was taken from hospital. PGI BBD was used to assess the cognitive functioning.* ***Results*** *indicated that domains on memory showed severe dysfunction, intelligence was moderately impaired and perceptual motor skills were mildly impaired. Out of the total number patients, 26% has no neuropsychological disability, 40% had mild disability, 24% of the patients have moderate level of disability and only 10% had severe neuropsychological disability. There is no significant relationship between age, education, duration of illness with Neuropsychological disability.* ***Conclusion:*** *Patients with TBI have some extent of dysfunction in memory, Intelligence, perceptual motor skills causing mild neuropsychological disability in 40% of the TBI cases. There is no significant relationship between age, education, duration of illness and neuropsychological disability.*

Key words: *Traumatic brain injury, cognitive functioning, memory, intellectual functioning, perceptual motor task, Neuropsychological Disability*

BACKGROUND

The brain injuries are either open, when the damage is caused by something that breaks the skull and penetrates the brain tissue or when the skull is not broken but there is diffuse axonal injury. In the later case the brain tissue can be stretched and damaged by brain movement inside the skull leading to bleeding and swelling internally. Traumatic brain injury is caused by many external factors such as a blow, fall, bullet, crash or an explosion. After any traumatic injury to brain, the brain doesn't heal completely and that's why some effects will be permanent.[1, 2] Therefore it can lead to wide range of changes effecting thinking, sensation, language and emotions ranging from mild concussion to severe. Nearly Sixty-nine million (95% CI 64-74 million) individuals are estimated to suffer TBI from all causes each year with low- and middle-income countries experience nearly 3 times more cases of TBI proportionally than the high-income countries.[3] It occurs mostly in persons aged 21 - 30 years males and most frequent external cause of injury was motor vehicle crash.[4] The verbal skills are most resistant to brain injury, followed by nonverbal reasoning and visuo-spatial ability, and then working memory with speed of information processing being the most vulnerable to the effects of brain injury. [5]. In aspects of intelligence, clinical impairment ranged from 8–25%, attention 39–62%, verbal memory 16–46%, visual memory 23–51%, visual-spatial construction 38%, and executive functions (verbal fluency) 13%. Also that 3–23% of performances across the measures was in the borderline range, suggesting a high prevalence of subclinical deficit.[6] The temporal dysfunctions in TBI patients are related to the deficits in cognitive functions involved in temporal processing. Temporal dysfunctions are observed when the length of temporal intervals exceeds the working memory span or when the temporal tasks require high cognitive functions to be performed.[7] It seems that after maximum spontaneous recovery from TBI, poorer cognitive functioning appears to be associated with both older age at the time of injury and increased time post injury.[8] The numbers of the Road traffic accidents are rising in the metropolitan cities so it is important to gaze the impaired or the disability caused by the situation. The deformity caused in the cognitive and physical areas are very prominent. Therefore, this study aims to find the cognitive impairment caused by traumatic brain injury. The duration of the Traumatic brain injury is often considered important. There are high rate of physical, neurologic, and psychiatric syndromes following TBI, a thorough neuropsychological assessment of the patient is a prerequisite to the prescription of any treatment for impaired cognition [9] and after recognizing the areas which are mostly affected by the injury this will be beneficial to devise a neuropsychological rehabilitation plan for the individuals/patients.

METHODOLOGY

Aim of the study is to assess the cognitive functioning and evaluate the extent of cognitive loss in Traumatic Brain injury. Objectives are to evaluate the severity of Memory dysfunction, Intellectual and Perceptual-Motor

impairment in TBI patients. 2. To assess the neuropsychological disability caused due to TBI. 3. To study the relation between age, education and duration of injury and cognitive loss. Data was collected using purposive sampling with size of 50 patients with Traumatic Brain Injury. A single group research design was carried out on patients visiting OPD at clinical psychology department at Hospital setup. PGI Brain Battery of Dysfunction developed by Pershad and Verma (1990) was used. For evaluating disability, disability percentage based on dysfunction rating score of PGI BBD, IBHAS annexure was used. Consent was taken from participants and those unwilling to participate, uncooperative and not being able to answer were not included in the study. All information was kept confidential and not disclosed to any persons. For statistical analysis SPSS 22 is used. Differential statistics is applied to calculate the mean and standard deviation. The correlation is applied to understand the relationship between age, education, duration of illness and cognitive loss.

RESULTS

The 12% of the participants were female and 88% were male ranging between age of 22 and 58 years. The participants educated at 10th standards and above were 48% with 76% having TBI history of less than 2 years.

Table I: Mean and Standard Deviation of Memory, Intellectual functioning, and Perceptual motor functioning. From the test manual the scores were compared, and it was found that TBI patients have severe dysfunction in memory whereas the intelligence was moderately impaired and perceptual motor skills were mildly impaired.

Variables	N	Mean	Std. Deviation
Memory	50	17.380	8.0961
Intelligence	50	7.200	5.0910
Perceptual-Motor Functioning	50	3.420	2.5160

Table II: Frequency and Percentage of Participant of TBI with Severity of Disability. From the total number patients, 26% has no neuropsychological disability, 40% of the patient had mild disability, and 24% of the patients had moderate disability and only 10% showed severe neuropsychological disability.

Severity of Disability	Frequency	Percentage
No Impairment	13	26%
Mild	20	40%
Moderate	12	24%
Severe	05	10%

Table III: Correlation between Demographical Variable (Age, Education, Duration of Illness) and Neuropsychological disability. There is no significant relationship between the variables.

	Age (years)	Education (years)	Duration of illness (months)
Neuropsychological disability	-.155	-.045	.126
**. Correlation is significant at the 0.01 level (2-tailed).			

DISCUSSION

The study assessed the cognitive functioning and evaluated the extent of cognitive loss in the 50 Patient with TBI. Results from the sample indicated that patients have severe dysfunction in domains of memory post head injury. Memory impairment is one the most affected areas in the TBI patients; It is the first function which is impaired and the last function to be regained in the recovery process (Rees et al, 2007). The severe TBI is likely to be associated with an impairment of executive domain of working memory (Vallat-Azouvi et al, 2007). Intelligence was moderately impaired and the perceptual motor skills were found to be mildly impaired. In the dimension of visuospatial perception changes such as the unilateral neglect, impairments of body scheme and constructional skills are common in severe TBI persons (McKeena et al. 2006).

While assessing the neuropsychological disability caused due to TBI it was found that out of the total number of patients with TBI, 26% has no neuropsychological disability, 40% of the patients had mild disability, 24% had moderate level of disability and only 10% belongs to severe neuropsychological disability category.

On accessing the relationship between age, education, duration of illness and neuropsychological disability it was evaluated that no significant relationship is found with the aforementioned variable. This may be because of the limited sample of the present study. As there are contraindicative studies implicating the relationship between

the Education level and cognitive impairment. Kesler et al. (2003) showed that higher education level may decrease chances of the cognitive deficits in patients with TBI. In a research conducted by Johns Hopkins (2014), reported that those with at least a college education are seven folds more likely than those who didn't finish high school to be without disability for one year after a TBI.

CONCLUSION

Patients with TBI have some extent of dysfunction in memory, Intelligence, perceptual motor skills causing mild neuropsychological disability in 40% of the TBI cases. There is no significant relationship between age, education, duration of illness and neuropsychological disability.

REFERENCES

[1] ICD-10
[2] Rehabilitation for Person with traumatic brain injury (2004). WHO. WHO/dar.01.9.Distr.:general
[3] Dewan MC, Rattani A, Gupta S, Baticulon RE, Hung YC, Punchak M, Agrawal A, Adeleye AO, Shrime MG, Rubiano AM, Rosenfeld JV, Park KB. (2018). Estimating the global incidence of traumatic brain injury. J Neurosurg. Apr 1:1-18. Doi: 10.3171/2017.10.JNS17352. Epub ahead of print. PMID: 29701556
[4] .Amit Agrawal, Sagar Galwankar, Vikas Kapil, Victor Coronado, Sridhar V Basavaraju, Lisa C McGuire, Rajnish Joshi, Syed Z Quazi, Sankalp Dwivedi. (2012). Traumatic brain injuries in a rural setting in Maharashtra. International Journal of Critical Illness and Injury Science | Vol. 2 | Issue 3 | Sep-Dec
[5] Clement PF, Kennedy JE. (2003). Wechsler Adult Intelligence Scale-third edition characteristics of a military traumatic brain injury sample. Mil Med. 168 (12):1025–1028.
[6] Nigel V. Marsha, Maria R. Ludbrookb and Lauren C. Gaffaney. (2016). Cognitive functioning following traumatic brain injury: A five-year follow-up. NeuroRehabilitation 38 71–78 DOI:10.3233/NRE-151297
[7] Giovanna Mioni, Simon Grondin and Franca Stablum. (2014). Temporal dysfunction in traumatic brain injury patients: primary or secondary impairment? Frontiers in Human Neuroscience. April|Volume8|Article269
[8] Senathi-Raja, Ponsford and Schonberger. (2010). Impact of Age on Long-Term Cognitive Function after Traumatic Brain Injury. Neuropsychology, Vol. 24, No. 3, 336–344. DOI: 10.1037/a0018239
[9] David B. Arciniegas, Kerri Held and Peter Wagner. (2002). Cognitive Impairment Following Traumatic Brain Injury. Current Treatment Options in Neurology, 4:43–57.
[10] Pershad D. & Verma S.K. (1990). Handbook of PGI Battery of Brain Dysfunction (PGI-
[11] BBD). National Psychological Corporation. 4/230; Kacheri ghat, Agra. pp 70–111
[12] Rees L, Marshall S, Hartridge C, Mackie D, Weiser M. Erabi Group. (2007). Cognitive interventions post acquired brain injury. Brain Inj., 21, 161–200.
[13] Vallat-Azouvi C., Weber, T., Legrand, L., & Azouvi, P. (2007). Working memory after severe traumatic brain injury. Journal of the International Neuropsychological Society, 13(5), 770-780. Doi: 10.1017/S1355617707070993.
[14] McKenna K, Cooke DM, Fleming J, Jefferson A, Ogden S. (2006). The incidence of visual perceptual impairment in patients with severe traumatic brain injury. Brain Inj., 20, 507–18
[15] Kesler R. S., Adams F. H., Blasey M.C., & Bigler D. E. (2003). Premorbid Intellectual Functioning, Education, and Brain Size in Traumatic Brain Injury: An Investigation of the Cognitive Reserve Hypothesis, Applied Neuropsychology, 10:3, 153-162, DOI: 10.1207/S15324826AN1003_04.
[16] Johns Hopkins Medicine. (2014). Higher education associated with better recovery from traumatic brain injury. ScienceDaily. Retrieved June 29, 2021 from www.sciencedaily.com/releases/2014/04/140423170659.htm.