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## To study the effectiveness of cognitive training combined with ADL training on quality of life in patient with mild traumatic brain injury

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### Abstract

Traumatic brain injury is very common in India. Most cases are belonging to mild traumatic brain injury. Men are very prone to injury than women and children. Due to mild traumatic brain injury cognitive impairment and activities of daily living skills are affected which leads to a decrease in quality of life. Patients with mild TBI result in loss of memory, attention deficits, psychological issues, and executive dysfunction due to these, there is an impact on individual active participation in daily living skills which ultimately leads to a decrease in quality of life.

In India, most men are the bread earners in their families so these injuries impact the psychosocial condition of the family also. The main purpose of this study is to improve the quality of life by improving the cognition ability through cognitive training and improving the individual active participation in basic daily living skills activity through ADL training.

**Keywords:** Cognitive, ADL, cognitive training, ADL training, TBI, quality of life

### Introduction

Traumatic brain injury known as damage to the brain, especially brain tissue is caused by a mechanical force externally as a result there is a loss of consciousness and post-traumatic amnesia which leads to cognitive impairment, behavioral impairment, or impairment of functioning. The persons having a traumatic brain injury have undergone certain changes in their ability to carry out valued tasks, roles, and day-to-day activities<sup>[1]</sup>.

Patients having mild traumatic brain injury within the first 24hr after trauma may lead to cognitive deficits called the acute phase. This phase may lead to functional impairment in long term and decrease in quality of life<sup>[2]</sup>.

Traumatic brain injury (TBI) is a condition that affects both men and women of all ages. The severity of TBI is categorized based on the Glasgow Coma Scale (GCS), in which patients are scored on the basis of clinical symptoms, and the resulting overall score classifies their injury as mild (score: 13–15), moderate (score: 9–12) or severe (score: <9). Mild to moderate TBI symptoms can include headaches, dizziness, nausea, and amnesia. These injuries usually resolve within days to weeks of the insult. Occasionally these injuries can result in long-term cognitive and behavioral deficits<sup>[3]</sup>.

Cognitive impairment is very common in patients having mild traumatic brain injury. Cognitive impairment leads to loss of memory, orientation, attention, and executive dysfunction. This impairment leads to a progressive loss of cognitive skills which may cause a decrease in the ability to perform tasks required for independent living. The problem-solving therapy and cognitive behavioral therapy may improve psychological functioning, decrease depression, increase activity and participation, and improve quality of life<sup>[4]</sup>.

Daily living activities require basic skills and it helps to focus on activities to take care of one's body. ADLs involve self-care tasks such as feeding, bathing, personal hygiene, communication, dressing/undressing, bowel bladder management, bed mobility, and transfers which are the requirements of daily life<sup>[5]</sup>.

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**Incidence**

In low and middle classes countries the burden of TBI remains high due to Road traffic accidents and a fall. Road traffic accidents are very common among young people and fall is very common in elderly people. India has the second largest country having a greater number of death cases due to traumatic brain injury. Men, women, and children of all age groups can suffer from head injuries. Road traffic accidents, a trip or fall, and a sports injury are the main causes of injuries that can range in severity from concussion to coma. Traumatic Brain Injury (TBI) can be fatal and can produce problems that mostly affect the livelihood and well-being of millions of people [6].

1.7 million TBIs occur annually in the United States and TBI is associated with 30.5% of all injury-related deaths according to the Centers for disease control and prevention. In 2010, the economic burden of TBI in the United States including direct medical and indirect costs such as loss of productivity, was estimated to be \$76.5 billion [7].

Traumatic brain injuries are a leading cause of morbidity, mortality, disability, and socioeconomic losses in India and other developing countries. It is estimated that nearly 1.5 to 2 million persons are injured and 1 million yields to death every year in India. Road traffic injuries are the leading cause (60%) of TBIs followed by falls (20%-25%) and violence (10%). Alcohol involvement is known to be present among 15%-20% of Traumatic brain injuries at the time of injury [8].

India has the highest rate of head injury in the world. More than 100,000 lives are lost every year with more than 1 million suffering from head injuries in India. In India, men are more prone to head injuries than women. In India, 1 out of 6 trauma victims die due to head injuries while in the United State, this figure is 1 out of 200. In India, Ninety-five percent of trauma victims do not receive optimal care during the “golden hour” period after an injury. The outcome of TBI is mainly correlated to the responses given by pre-hospital care and rehabilitation. Most road traffic accident victims are belonging to the age group of 20-40year and they are the main bread-earners of their family which puts the whole family below the poverty line in many cases. Globally 50 million are injured every year and the estimated death rate is 1.2 million. 70 percent of fatalities under 45 years of age and 3,300 deaths and 6,600 injuries occur every day according to the world health organization (WHO). In India, 60 percent of TBI is caused by road traffic accidents. The fatality rate is 70 percent. 15-20 percent of TBI is caused by alcohol intake. In India every 6-1s0min a person dies due to TBI. In India, most road traffic accidents occur in Rajasthan state.

**Methods**

Qualitative studies were included in the review based on the objectives of the current review inclusion and exclusion criteria were prepared and based on that various database were used in selection of the study. The collected studies were checked for clarity and contain and used for review.

**Criteria for sample collection**

Two criteria via inclusion and exclusion criteria were used for selection of sample.

**Inclusion criteria**

- Age- 20-60 years
- Both males & females
- Glasgow coma scale score between 13 to 15
- MMSE Score in between 18 to 24.

**Exclusion Criteria**

- Patient with other disability
- Patient with deformity
- Patient with other comorbid

**Electronic database searching**

The database searched

- PubMed
- Online journals
- Access open
- Goggle scholar
- Research gate

**Data collection and quality assurance**

‘PRISMA’ flow diagram was used to select the articles eligibility criteria were assessed for extracted data, included studies were evaluated on basis of relevance appropriateness, clarity and methodology.

These studies that were not meeting the criteria were excluded.

Articles selected for review were assessed by two independent reviewers, the data extracted included participants, year of publication, study method, types of intervention and outcome.

**Analysis**

**Steps of analysis**

Obtained data were tabulated and classified as author, study design, year of publication, setting method, sample size, type of intervention, components of intervention and outcome.

Identifying the findings of the studies. The studies were identified with their setting methods and sample size, type of intervention and components of intervention.

Categorizing the findings. Findings were categorized under the heading of the effect of enhanced OT intervention on improving cognition skills through cognitive training and basic daily living activities through ADL training in mild Traumatic brain injury patients.

**Results**

The review study included 250 potentially relevant articles out of which 200 studies were excluded as duplicate, 25 studies were excluded as they didn’t meet inclusion and exclusion criteria, 15 articles didn’t mention the intervention and 10 studies were included for review.

**Characteristics of the articles**

Out of the 10 studies included in the review, all the review was the qualitative study. Majority of the studies were conducted in the hospital settings. These studies were published between 2010 to 2022.

S.N	Study/ Author	Year of publication	Research design	Number of participants	Sample character	Theme	Sub theme
1	Marika C. Moller <i>et al</i>	2021	A Randomized	864	Mild Traumatic	To determine the effectiveness of	The results indicate that there may be positive effects of specialized interventions for people with

			control trial study		brain injury.	specialized rehabilitation in adults with prolonged symptoms, or risk of prolonged symptoms, following mild traumatic brain injury.	mild TBI with prolonged symptoms, such as CBT or PST, and from team-based interdisciplinary rehabilitation, compared with usual care. For specialized brain injury-oriented rehabilitation consisting of CBT or telephone-based problem solving, there were positive effects on post-mild TBI symptoms, general psychological function, depression, activity and participation, and quality of life.
2	Krista Engle <i>et al.</i>	2020	A randomized controlled study	144	Traumatic brain injury and post-traumatic stress disorder	To examine the effectiveness of a 9-h group cognitive training targeting higher-order functions, Strategic Memory Advanced Reasoning Training (SMART), compared to a 9-h psychoeducational control group in improving neurocognitive functioning adults with mild TBI and PTSD.	A randomized, double-blinded study compared a strategy-based cognitive training program (SMART) to a psychoeducation control group (BHW) in adults with mild and moderate TBI in chronic stages after the injury and/or PTSD.
3	Pieter E. Vos <i>et al.</i>	2019	A Prospective study	797	Mild TBI	PCS is common after mild TBI and patients suffering from PCS have a considerably lower HRQL. To better assessment and intervention strategies for PCS are needed in MTBI patients with PCS are detected shortly after sustaining the injury.	The objectives of this paper were to elucidate the association between PCS and HRQL six months after mild TBI and the correlation between the RPQ items with SF-36 domains and PQL subscale scores.
4	Konstantin born <i>et al.</i>	2018	A prospective study	199 participants having injury severity score >15.	Mild TBI	The Quality of Life after Brain Injury (QOLIBRI) score was developed to assessed disease-specific health-related quality of life (HRQL) after traumatic brain injury (TBI).	The first evaluation of the QOLIBRI with regard to one-year outcome in a cohort of severely injured patients that includes both major and no or only mild TBI. The total QOLIBRI did not correlate at all and the cognitive sub-score correlated only poorly with major TBI in this investigation. 2.) The cognitive dimension of the QOLIBRI correlated weakly, but better with TBI than the other mental scales of HRQL or functional outcome scores.
5	F M Bosco <i>et al.</i>	2018	Pre post experimental study	19	Traumatic brain injury	This study showed that the CPT was effective in improving the patient having communicative abilities. The possibility that the benefits of the CPT may generalize to everyday communicative interactions.	The aim of this study was to verify the effectiveness of the Cognitive Pragmatic Treatment (CPT) in improving communication abilities after TBI, thus enabling better management of communication activities in daily living.
6	Caplan <i>et al.</i>	2015	Randomised controlled trial	50	Mild Traumatic brain injury	The study demonstrated significant CogSMART-associated reductions in post-concussive symptoms and improvements in prospective memory and quality of life.	To developed and tested a 12-week, manualized, compensatory cognitive training intervention, Cognitive Symptom Management and Rehabilitation Therapy (CogSMART), which targeted post-concussive symptom management, prospective memory, attention, learning/memory, and executive functioning. The intervention focused on psychoeducation and compensatory strategies such as calendar use, self-talk, note-taking, and a 6-step problem-solving method.
7	Li-Fong Lin <i>et al.</i>	2014	Randomized controlled trial	107	Traumatic brain injury	The study performed the postural-stability test and a modified clinical test of sensory integration by using the Biodex Stability System (BBS). DHI scores were	To examine the disparities in balance functions and sensory integration in patients with mild traumatic brain injuries and healthy controls.

						substantially increased in patients following a mild TBI compared with the scores of the control group. The postural-stability test indices and the sensory-integration test index were substantially lower in patients with mild TBI than in the controls.	
8	Azulay <i>et al.</i>	2013	Pre-post treatment intervention	22, (age group 18-62 years)	Traumatic brain injury	Clinically meaningful improvements were noted on measures of quality of life (Cohen $d = 0.43$ ) and perceived self-efficacy (Cohen $d = 0.50$ ) with smaller but still significant effects on measures of central executive aspects of working memory and regulation of attention by MBSR Programme.	To evaluate the effectiveness of the mindfulness-based stress reduction (MBSR) program tailored to individuals with mild traumatic brain injury.
9	Anupam Gupta <i>et al.</i>	2012	A prospective study	40	Traumatic brain injury	Asses functional outcome of rehabilitation in chronic severe Traumatic brain injury.	This study aimed to show functional recovery in chronic phase with neurological rehabilitation having physical and cognitive deficits by using mean score of disability rating scale.
10	Christopher A. <i>et al.</i>	2011	A Case study	1	Mild traumatic brain injury	To describe a Mild traumatic brain injury specific clinical assessment and rehabilitation intervention in a virtual environment.	Virtual Reality based treatment no longer exacerbated the patient symptoms, reduction of visual vertigo and PFC also showed improvement on measures of static and dynamic balance.

## Conclusion

After traumatic brain injury, the patient has problems basically in cognitive skills as the patient is unable to express his words due to problems in memory and problem-solving skills. Sometimes patient shows the behavioral problem and difficulty communicating which adversely affects both ADL skills and cognitive skills, which ultimately leads to a decrease in quality of life. To improve the quality of life of an individual previous intervention finds that cognitive training in mild TBI patients showed significant improvements in memory and executive functioning. Some previous studies show cognitive strategies training also increases cognitive performance and self-related quality of life in individuals with mild traumatic brain injury. The balance and posture which is required for the activity of daily living skills of the individuals improved by motor training and basic ADL training. Here the main purpose of the study is to improve the quality of life of an individual suffering from mild traumatic brain injury through cognitive skills like memory, attention and executive function through cognitive training and basic Activity of daily living skills through ADL training. To date, there has been limited research into the combined uses of the training and further studies are needed to determine the effectiveness of this approach. By combining both cognitive and ADL training promoting the better quality of life in mild traumatic brain injury patient.

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