

ORIGINAL ARTICLE**EFFECT OF COGNITIVE REHABILITATION ON COGNITION AND FUNCTIONAL STATUS IN OLDER ADULTS WITH MILD COGNITIVE IMPAIRMENT****Aishwarya Paraswar¹, Dr. Janhavi Atre (PT)², Dr. Rasika Kaluskar (PT)³, Dr. Rameshwari Korbekar (PT)⁴, Dr. Mahendra Shende⁵**¹B.P.Th (Intern), ²Assistant Professor, ³Assistant Professor, ⁴Associate Professor, ⁵Principal, Tilak Maharashtra Vidyapeeth, Pune.**ABSTRACT:**

Background: Cognitive Impairment is when a person has trouble remembering things or familiar peoples, learning new things, concentrating on their everyday tasks, or making decisions about their everyday lives. Cognitive impairment leads to more incredible difficulty to perform Activities of daily living (ADLs). **Methods:** This is an experimental study in which thirty older adult individuals were selected according to the convenience sampling technique between 61-80 years. The selected population were screened for cognitive impairment by Mini-Mental State Examination. The population chosen was treated by giving cognitive exercises. The treatment was given for 20 minutes, five days per week for four consecutive weeks. The outcomes measures used in the study was the Six-Item Cognitive Impairment Scale (6-CIT) and the Functional Status Questionnaire (FSQ). **Result:** There was significant improvement noted in the Six-Item Cognitive Impairment Scale and Functional Status Questionnaire scores. **Conclusion:** The study concludes that Cognitive Rehabilitation is effective in improving cognition and functional status in older adults with Mild Cognitive Impairment.

Keywords: Older Adults; Mild Cognitive Impairment; Cognition; Cognitive Exercises; 6-Item Cognitive Impairment Scale; Functional Status Questionnaire.

INTRODUCTION:

Cognitive impairment is when a person has trouble remembering things or familiar peoples, learning new things, concentrating on their everyday tasks or making decisions about their everyday life. Mild Cognitive Impairment (MCI) is mainly caused due to various etiologies. In addition to neurodegenerative conditions such as AD, Dementia with Lewy Bodies, and Parkinson's disease, other possible etiologies cause MCI, including cardiovascular, metabolic, endocrine, traumatic, and psychiatric origins. The most common neuropsychiatric issues associated with MCI include depression, anxiety, irritability, agitation, apathy, euphoria, disinhibition, delusions, hallucinations, and sleep disorders. Cognitive impairment associated with MCI can affect virtually

all domains, including memory, language, attention, visuospatial functioning, and executive functions.^[1] Cognitive impairment leads to more incredible difficulty to perform Activities of daily living (ADLs).^[2] The loss of independence begins when there is a decline in the Instrumental activities of daily living (IADL). Activities such as shopping, using the media, managing money, and others require interaction with the environment, cognitive skills, and social interaction.^[4] Instrumental Activities of Daily Living entitles more complex activities necessary for independent living such as cooking, household chores, and handling money. While ADLs are basic with more physical self-care tasks essential for independent living, including bathing, dressing, and feeding.

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Cognitive functions mostly affected due to neurodegenerative diseases include attentional, visuospatial, and constructional, executive, and motor function, which impacts everyday activities and quality of life in older adults with MCI. Also, research suggests that individuals with MCI experience changes in their psychological and daily functioning and their quality of life.^[3] So, it is necessary to differentiate normal cognitive ageing from neurodegenerative diseases to detect cognitive deficits early and provide adequate treatment to avoid further neurodegeneration and cognitive dysfunction.^[4]

In addition to age and certain diseases, conditions such as social, psychological, and lifestyle factors may also contribute to declines in cognitive functioning.^[5] Previous research has demonstrated that training and treatment are beneficial for patients with MCI and dementia. Therefore, practical training and treatment may prevent MCI and dementia.^[6]

Ball et al. conducted a cognitive training study that included 2832 elderly adults. The study included multiple factors such as memory training and cognitive processing, and the results demonstrated a cognitive functioning improvement in the treatment group.^[18] It also concluded that daily living (ADL) cognitive function and activities declined slowly in this study. In addition, Jean performed a systematic review and concluded that cognitive training in older adults improves memory capacity.^[7]

Hence, a study was planned to study cognitive rehabilitation's effect on cognition

and functional status in older adults with mild cognitive impairment.

METHODS:

Ethical clearance was obtained from the Research Ethics Committee of the Tilak Maharashtra Vidyapeeth, Department of Physiotherapy. The present study was an Experimental type of study with a convenience sampling technique conducted

in different old age homes in Pune. Participants were included who met the inclusion criteria. Forty participants from nursing homes were screened for mild cognitive impairment by using Mini-Mental State Examination Scale (MMSE), out of which thirty participants with mild cognitive impairment were recruited. Both males and females were included with age group between 60-81 years who were diagnosed with cognitive impairment with Mini-Mental Examination Scale score 18-24 were included in the study. Visual and Auditory impaired individuals were excluded from the study. Pre and Post cognition and functional status were screened using the 6 CIT and Functional Status Questionnaire, respectively. Individuals were treated according to the treatment protocol.

INTERVENTION:

Individuals performed cognitive exercises, which consisted of puzzles, maze games, finding missing numbers and counting numbers in ascending and descending order. The intervention was given for twenty minutes per session, for five days per week for consecutive four weeks.

The Six-Item Cognitive Impairment Test (6-CIT)^[8] consists of six questions with a total score of 28 where 0-7 is average, 8-9 is mild cognitive impairment, and 10-28 is significant cognitive impairment. The Functional Status Questionnaire (FSQ)^[9] consists of five sub-sections with scores different for each subsection.

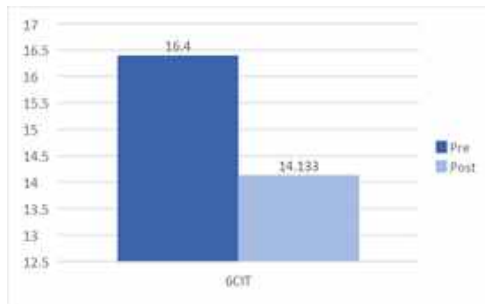
DATA ANALYSIS:

Statistical analysis was performed using InStat software. The scores of Six-CIT and FSQ were analyzed using mean and standard deviation. Shapiro Wilk test was done to find out if the data obtained passed the normality test. Scores of Six-CIT passed the normality test; hence Paired t-test was performed. Scores of FSQ did not pass the normality test; therefore, Wilcoxon signed-rank test was performed.

RESULT:

Table 1: Shows graphical representation of pre-intervention and post-intervention scores on the Six-Item Cognitive Impairment Scale.

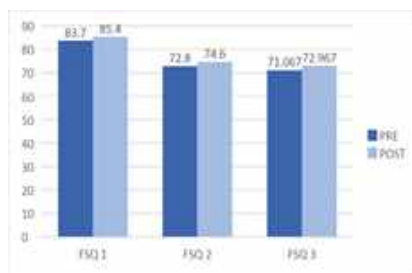
	Pre	Post
CIT	16.4±5.035	14.133±5.002



Interpretation: - Above graph shows values of the 6 CIT scale. With Pre value of 16.4 and a Post value of 14.133. With P-value < 0.001.

Table 2: Graphical representation showing Pre and Post result of Functional Status Questionnaire 1 to 3.

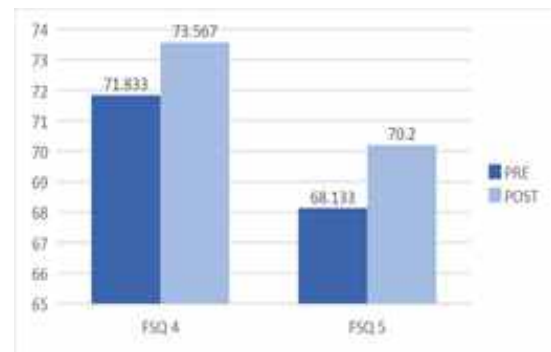
	Pre	Post
FSQ 1	83.7±3.678	85.4±3.597
FSQ 2	72.8±3.295	74.6±3.5
FSQ 3	71.067±3.279	72.967±2.785



Interpretation: - Above graph shows values of FSQ 1,2,3 scale. With Pre value 83.7, 72.8, 71.067 and Post value 85.4, 74.6, 72.967 respectively. With P value < 0.001.

Table 3: Graphical representation showing Pre and Post result of Functional Status Questionnaire 4 and 5.

	Pre	Post
FSQ 4	71.833±2.394	73.567±2.192
FSQ 5	68.133±2.145	70.2±2.172



Interpretation: - Above graph shows values of FSQ 4,5 scale. With Pre value 71.833, 68.133 and Post value 73.567, 70.2 respectively. With P value < 0.001.

DISCUSSION:

The present study results suggest a beneficial effect of cognitive exercises in the geriatric population four weeks following the intervention.

Many studies have conducted studies in older adults and concluded that age is an essential factor affecting cognitive functioning in older adults.^[10,11]

The participants in the present study were 60-80 years of age. Decline in bodily functions of older adults, especially in the nervous and muscular systems, greatly influence cognitive abilities and ADL.^[12]

The most reasonable mechanism of cognitive exercises could be neural plasticity or transfer of learning, which brings changes in brain development and enhances cognitive skills, which consists of attention, psychomotor speed, orientation, and executive function, which is stimulated by neural activity patterns in the right angular gyrus and left lingual gyrus.^[13] The repetition of these patterns through different tasks and authorized games can help improve connectivity in the brain, create new synapses in the brain, and myelinate neural circuits, able to recover and reorganize main cognitive function.^[14]

Many studies have established that the combined cognitive exercises, including art, music, exercise, and recollection, and horticultural therapy, can improve and maintain cognition and physical performance in mild cognitive

impairment in older adult individuals.^[15,16]

In the pre-evaluation of the Six-Item Cognitive Impairment Scale, the patient had a problem recollecting the present time, memorizing the given address, counting numbers in backward order, and recalling months of the year in reverse order. But after the intervention, the patients could recollect the time, count numbers in backward order with some to none mistakes counting, recite months in a backwards manner and recall the given address with some to no errors.

Functional Status Questionnaire consists of different questions related to their day-to-day activities. These activities consist of walking, stair climbing, doing errands and other works around the house and inquiries related to their psychological health. Then they were given the intervention of 4 weeks which showed improvement in their activities and mental health. The other subtype of the scale includes Work Performance, Social Activities and Quality of Interactions. These subtypes consist of questions based on their work, their involvement in social activities, and their amount of interaction with family members and friends. Then intervention was given, which consist of 4 weeks. The result showed that there is improvement in their activities and interactions.

According to the previous study conducted by Jeba Chitra, there is improvement in the cognitive level of older adults with mild to moderate dementia who were given cognitive rehabilitation for four weeks. They used a 6 CIT scale.

According to the previous study done by Marilyn Huckans stated that the treated protocol showed improvements in objective cognitive performance. Still, the pattern of effects on specific cognitive domains was inconsistent across studies. Other vital outcomes seen were daily functioning, quality of life, neuropsychiatric symptom severity was infrequently assessed across studies.

CONCLUSION:

The study concludes that Cognitive Rehabilitation is effective in improving cognition and functional status in older adults with Mild Cognitive Impairment.

LIMITATIONS:

- 1) The result of the present study could not be generalized to the overall population with mild cognitive impairment as the sample size of the study was relatively small.
- 2) Long term follow-up of the level of cognition level could not be assessed.

FUTURE SCOPE:

Long term follows up can be taken from the study group.

FUNDING:

There was no funding given for the research.

CONFLICT OF INTEREST:

No conflicts reported.

ACKNOWLEDGMENT:

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REFERENCES:

1. Huckans M, Hutson L, Twamley E, Jak A, Kaye J, Storzbach D. Efficacy of cognitive rehabilitation therapies for mild cognitive impairment (MCI) in older adults: working toward a theoretical model and evidence-based interventions. *Neuropsychology review*. 2013 Mar 1;23(1):63-80.
2. Connolly D, Garvey J, McKee G. Factors associated with ADL/IADL disability in community-dwelling older adults in the Irish longitudinal study on ageing (TILDA). *Disability and rehabilitation*. 2017 Apr 10;39(8):809-16.

3. Albert MS, DeKosky ST, Dickson D, Dubois B, Feldman HH, Fox NC, Gamst A, Holtzman DM, Jagust WJ, Petersen RC, Snyder PJ. The diagnosis of mild cognitive impairment due to Alzheimer's disease: recommendations from the National Institute on Aging-Alzheimer's Association workgroups on diagnostic guidelines for Alzheimer's disease. *Alzheimer's & dementia*. 2011 May;7(3):270-9.
4. Deary IJ, Corley J, Gow AJ, Harris SE, Houlihan LM, Marioni RE, Penke L, Rafnsson SB, Starr JM. Age-associated cognitive decline. *British medical bulletin*. 2009 Dec 1;92(1):135-52.
5. Tervo S, Kivipelto M, Hänninen T, Vanhanen M, Hallikainen M, Mannermaa A, Soininen H. Incidence and risk factors for mild cognitive impairment: a population-based three-year follow-up study of cognitively healthy elderly subjects. *Dementia and geriatric cognitive disorders*. 2004;17(3):196-203.
6. Boissonneault GA. MCI and dementia: diagnosis and treatment. *Journal of the American Academy of PAs*. 2010 Jan 1;23(1):18-21.
7. Jean L, Bergeron MÈ, Thivierge S, Simard M. Cognitive intervention programs for individuals with mild cognitive impairment: a systematic review of the literature. *The American Journal of Geriatric Psychiatry*. 2010 Apr 1;18(4):281-96.
8. O'Sullivan D, O'Regan NA, Timmons S. Validity and Reliability of the 6-Item Cognitive Impairment Test for Screening Cognitive Impairment: A Review. *Dement GeriatrCognDisord*. 2016;42(1-2):42-9.
9. Jette AM, Davies AR, Cleary PD, Calkins DR, Rubenstein LV, Fink A, Kosecoff J, Young RT, Brook RH, Delbanco TL. The Functional Status Questionnaire: reliability and validity when used in primary care. *J Gen Intern Med*. 1986;1(3):143-9.
10. WH Zhang, GF Zhao, XC Liu, et al. Cognitive Function and Related Factors of Urban Elderly: a cross-sectional study. *Chinese Mental Health Journal*. 2001;15:327-30.
11. ZW Li, YQ Huang, YZ Liu, et al. Influential factors about the decline of cognitive ability in the elderly. *Chinese General Practice*. 2008;11:174-6.
12. Yao S, Zeng H, Sun S. Investigation on the status and influential factors of cognitive function of the community-dwelling elderly in Changsha City. *Arch GerontolGeriatr*. 2009 Nov-Dec;49(3):329-34.
13. Irish M, Cunningham CJ, Walsh JB, Coakley D, Lawlor BA, Robertson IH, Coen RF. Investigating the enhancing effect of music on autobiographical memory in mild Alzheimer's disease. *Dement GeriatrCognDisord*. 2006;22(1):108-20.
14. Satoh M, Yuba T, Tabei K, Okubo Y, Kida H, Sakuma H, Tomimoto H. Music Therapy Using Singing Training Improves Psychomotor Speed in Patients with Alzheimer's Disease: A Neuropsychological and fMRI Study. *Dement GeriatrCogn Dis Extra*. 2015 Sep 4;5(3):296-308.
15. Aguirre E, Woods RT, Spector A, Orrell M. Cognitive stimulation for dementia: a systematic review of the evidence of effectiveness from randomized controlled trials. *Ageing Res Rev*. 2013 Jan;12(1):253-62.
16. Kim HJ, Yang Y, Oh JG, Oh S, Choi H, Kim KH, Kim SH. Effectiveness of a community-based multidomain cognitive intervention program in patients with Alzheimer's disease. *GeriatrGerontol Int*. 2016 Feb;16(2):191-9.