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Effect of Cognitive Training on Activities of Daily Living of Elderly - An Experimental Study

Sabeeha Haradwala[1], Dhara Vaghela[2]

E mail: *sabeehaharadwala[at]gmail.com*

Abstract: ***Background: Cognitive changes with time or with ageing are normal but there is significant variability in age-related cognitive from individual to individual. Many older adults experience difficulty with IADLs as their cognitive function begins to decline. Need: The need of this study is to see, to what extend the cognitive therapy can help the elderly to perform their activity of daily living independently and more accurately. Aim: Effect of cognitive training on activities of daily living of elderly. Method: 34 elderly individuals aged between 60-70 years were included in the study according to the inclusion criteria. Treatment took place for 4 weeks and session will be given 4 times a week. Outcome: MMSE (for screening), Lawton instrumental activity of daily living and Katz index of independency in activities of daily living scale. Result: After treatment of 4 weeks and 4 times a week there was significant improvement in ADL of elderly.***

Keywords: Cognition, MMSE, Katz index and Lawton instrumental activity of daily living

1. Introduction

Globally, the population has aged. World Health Organization (WHO) has predicted that, by 2050, those aged 80 years or more will number 400 million people. [1] Ageing, is an irreversible process which is commonly measured by chronological age and as a convention, a person aged 65 years or more is often referred to as 'elderly. [2] However, the process of ageing is not uniform across the population due to differences in different aspect of life that is in genetics, lifestyle, and overall health. [3] Although there are different ways by which population can be classified , one of the ways are elderly adults between the ages of 65 and 74 years as youngest-old, those between ages 75 and 84 years as middle-old and over 85 years as oldest-old. [4] The term cognition which refers to the mental processes involved in gaining knowledge and comprehension. There is of course significant variability in age-related cognitive changes which takes place from individual to individual. Some of reasons of the variability may be because of genetic differences, and studies estimates that 60% of cognitive ability can be attributed to genetics. [5] These cognitive processes include a long list from which thinking; knowing, remembering, judging, and solving are most commonly involved. Cognition is in reality is associated which higher-level functions of the brain and encompass language, imagination, perception, and planning. [6] Abilities such as conceptual reasoning, memory, and processing speed, declines over time. There are significant heterogeneity among adults in the rate of decline in some abilities, such as measures of perceptual reasoning and processing speed. [7] The cognitive functions which are most commonly affected by age are attention and memory. All types of attention that is focused, sustained, alternate, divided and all the three type of memory that is immediate, short term and long term gets affected. Perception (although considered by many to be a precognitive function) refers to the ability to hear, see, or become aware of also shows significant age-related declines. [8] "Use it or lose it" has become a familiar refrain to remind us the importance of keeping oneself busy and engaging in stimulating activities in order to preserve cognitive function in old age. Brain plasticity is measured by neurotransmitter (eg, acetylcholine, dopamine) function, increased cerebral blood flow, activity-related gene expression, and new cell growth (neurogenesis) in hippocampus. [9] The activities of daily living (ADLs) is a term which is used to collectively describe fundamental skills required to independently care for oneself, such as eating, bathing and mobility.ADL is used as an indicator of a person's functional status which is of at most importance. The inability to perform that is activities of daily living results in the dependence of oneself to other individuals and/or mechanical devices. The inability to accomplish essential activities of daily living may lead to unsafe conditions and poor quality of life and decreased self confidence. Measurement of an individual's ADL is important as these are predictors of admission to nursing homes, need for alternative living arrangements, hospitalization, and use of paid home care or any other form of medical or paramedical care. The outcome of a treatment program is assessed by reviewing a patient's ADLs, in this study Lawton instrumental activity of daily living scale is used to assess ADLs. [10] Aging is a natural process that may be present with a decline in the functional status of patients and is a common cause of markable loss of ADLs. Musculoskeletal, neurological, circulatory, or sensory conditions can lead to decreased physical function leading to impairment and deprovement in ADLs. A cognitive and/or a mental decline can also lead to of N number impaired ADL's. [11] Age-related changes in the temporal lobes and decrease in the volume of the hippocampus is noted. This decline can tell us or can explain us why ADL is affected with ageing. [12]

Objective:
Effect of cognitive training on activities of daily living of elderly

2. Need of the Study

Globally, the population is ageing and the WHO predicts that, by 2050, the population aged 60 years or more will double. There are many changes which takes place due to aging in normal person's life at physiological and biological level. Cells from each and every system of the body start degenerating weather it maybe from musculoskeletal, cardiopulmonary and digestive to the nervous system. This degeneration of cell from the body causes temporary or permanent loss to the system which can hamper ADL of elderly individuals. Many studies have investigated physiological benefits of physical exercise in aging; however few examined potential cognitive therapy benefits. The need of this study is to see, to what extend the cognitive therapy can help perform their activity of daily living independently and more accurately.

3. Methodology

- **Source of data:** Old age home Ahmadabad and Ahmadabad OPD
- **Research design:** Experimental study
- **Sampling method:** Simple random sampling
- **Sample size:** 34 (GROUP A-17, GROUP B-17)
- **Study duration:** the study took place for 6 months

The subjects were selected according to the inclusion and exclusion criteria

Inclusion criteria
Participants willing to participate
Age between 60-70yrs
MMSE (mini mental state examination) score more 24
Stable patients
Living independently

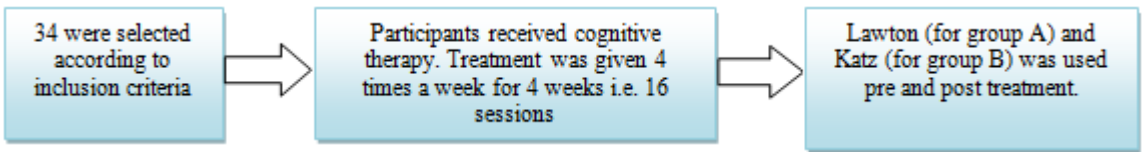
Exclusion criteria
Participants having COPD or any other respiratory disease
Participants having Alzheimer's or any other neurological disease
Patient undergone CABG or any other cardiac operation
Patient with vision problem
Patient with hearing problem
Patient who are not able to come for therapy on regular basis
Who had recently taken cognitive training.

Activity 1: Circle the drawings equal to those that were separated in a picture; draw geometric figures. Activity 2: Connect points; making various body movements (like beating the right hand on the left breast, hitting a foot on the ground). Activity 3: Guessing game: connect points and discover which drawings are formed. Activity 4: Each elderly person is expected to adopt the characteristic sound of that animal/ object that appears in their prints and the others try to guess.
Activity 5: Gujarati rhymes were used for singing and memorization of the lyrics and melodies
Activity 6: Talk about each elderly person's history of falls; the elderly were divided into smaller groups and each group received the game "Lookout for Risks" in order for the correct associations to be made
Activity 7: Various personal hygiene products were mixed with various other objects and placed in a box. This box was circulated amongst the elderly for each of them to pick up an important object for hygiene and state what it is and what it achieves.

Outcome Measures
Lawton instrumental activity of daily living scale. Functional assessment instruments measure ADLs and IADLs (instrumental activity of daily living) .Some also focus specifically on mobility, a crucial aspect of adult independence that is necessary for many ADLs and IADLs. The Lawton IADL scale takes 10 to 15 minutes to administer and contains eight items, with a summary score from 0 (low function) to 8 (high function). Each ability measured by the scale relies on either cognitive or physical function, though all require some degree of both. Internal consistency (Cronbach's alpha) value was 0.843 for the whole scale. The intra class correlation coefficient value of the scale was 0.915. [13]

Katz activity of daily living
An effective way to evaluate the health status of older adults is through their functional ability. An objective assessment which provides objective data helps indicate decline or improvement in health status, allowing the physiotherapist to plan and intervene appropriately.

4. Flow Chart



Informed consent was taken from the remaining 34 participants. Allocation to the groups was done using simple random sampling. Lottery method was used for the allocation and participates was not knowing the allocation groups i.e. the search done was a single blinded study.

Initial evaluation is done using MMSE scale.

During the execution of the activities, group techniques were utilized in order to ensure a collective perspective and interactive manner with the elderly individuals.

Groups were treated with a pre planned cognitive along with physical therapy treatment protocol along which included training cognition at every aspect.

Group A was assessed using Lawton and Group B was assessed using Katz index of independency in activities of daily living scale.

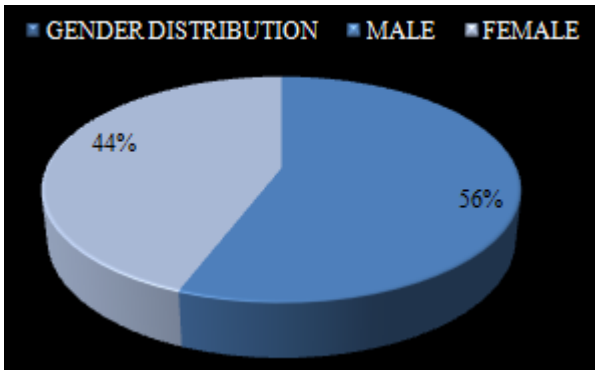
5. Result

Total 34 participants were included in the study. Data analysis was done on the outcome

Lawton instrumental activity of daily living scale and katz index of independency in activities of daily living scale.

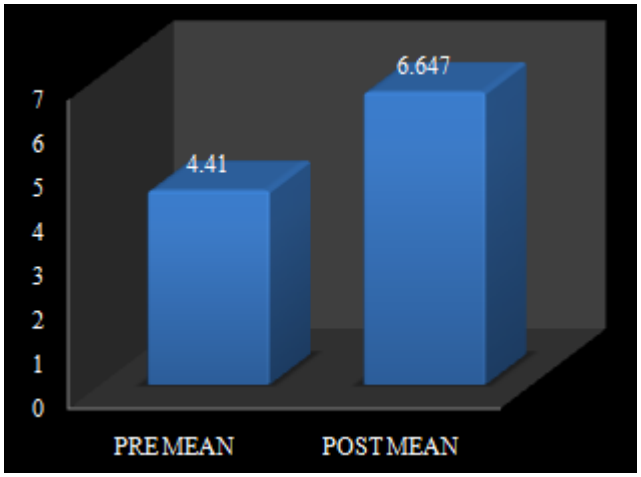
Data were analyzed using statistical package for social science version 28 (SPSS v28) and Microsoft excel 2010 with the significance level of statistical analysis is $p<0.05$.

Gender Mean Age	**63.2 ± 4.53**

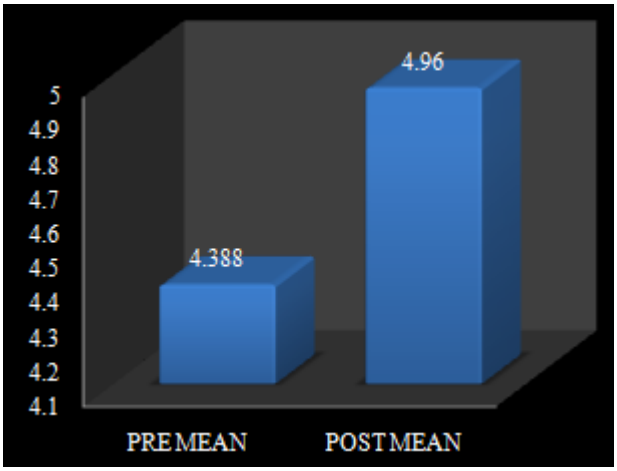


Wilcoxan signed ranked test was applied for the analysis of pre and post treatment outcome measures within the group.

Outcome Measure Lawton Scale	Pre (Mean±SD)	Post (Mean±SD)	Z Value	p Value
	4.41± 1.227	6.647± 0.785	-3.5	<0.01



Outcome Measure Katz Scale	Pre (Mean±SD)	Post (Mean±SD)	Z Value	p Value
	4.388±0.707	4.96± 1.251	-1.342	<0.01



6. Discussion

The present study was conducted to find out the effect of cognitive training on ADL of Elderly.

Here participants were randomly allocated to in both the groups. According to the statistical analysis done cognitive therapy was effective in improving ADL.

Brain training (also called cognitive training) is a program of regular activities purported to maintain or improve one's cognitive abilities. “Cognitive ability” is the phase usually referred to components of fluid intelligence such as executive function and working memory. The idea behind Cognitive training is based on that the brain, even in old age, can change for the better. Cognitive training uses guided practice which includes sets of tasks related to memory, attention, or other brain functions. This training can take many shapes. It typically involves using repetitive exercises designed to improve single (e.g memory) or multiple (e.g memory and reasoning) cognitive abilities which can in turn help improve ADL of elderly.

The similar results were found by **Saieda Abd-Elhameed Abd-Elaziz , Eman M. Khedr** *et al* in 2015 who worked on Application of training program about cognitive impairment of stroke. [14] Elderly patients have significant therapeutic effect on cognitive function, and also on the activities of daily living.

Another study done by **Doi T. Shimada H. Makizako H**. *et al* on Cognitive Activities and Instrumental Activity of Daily Living in Older Adults with Mild Cognitive Impairment. [15] The study included 2,498 cognitively healthy subjects (mean age, 71.2 ± 5.1 years) and 809 MCI subjects the subjects were interviewed regarding their participation in cognitive activities and the implementation of IADLs. The result concluded that there were improvements in activity of daily living in both the groups.

Another study done by **Kim, Se-Yun** *et al* on Effects of a Computerized Cognitive Training on Cognitive, Depression, Life Satisfaction and Activity of Daily Living in Older Adults with Mild Dementia. [16] In this study participants were 32 older adults diagnosed with mild dementia who reside in nursing hospital and were randomly divided into two group 16 for an experimental group and 16 for a control group. A CCT was performed for 8 weeks in the experimental group. The CoTras-G was used for CCT. The MMSE-K, SGDS-K, ELS and BI were administered in the experimental group and the control group in the same way in order to examine the effects of CCT. The difference of the effects between before and after a CCT conduction were found using paired t-test. Moreover, Mann-Whitney U-test was introduced to identify differences in variances between groups. Only participants in the experimental group were reported to have significant improvements in cognitive function, depression, life satisfaction and activity of daily living when compared to those in the control group after CCT.

Better results were found in Lawton instrumental activity of daily living scale than compared to Katz index of independency in activities of daily living scale. This suggests that there would be better improvement in Instrumental activity of daily living than Basic activity of daily living.

7. Conclusion

It has concluded that there is statically significant improvement in their ADL in elderly who received cognitive therapy. After 4 weeks of treatment significant improvement was noted in terms of Lawton instrumental activity of daily living scale and Katz index of independency in activities of daily living scale. Better results were found in Lawton Instrumental activity of daily living scale than compared to Katz index of independency in activities of daily living scale. This suggests that there would be better improvement in Instrumental activity of daily living than Basic activity of daily living Thus it can be concluded that cognitive therapy is effective in reducing functional disability and improving ADL of elderly.

8. Future Scope of the Study

Future Scope

1) Future study with a larger population
2) Further studies are needed to examine long term effect of the therapy
3) Future studies can be done on elderly with MMSE less than 24 and to see the effect of the protocol used

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Author Profile

Sabeeha Haradwala, MPT (Rehabilitation Science) student studying in Shree Swaminarayan Physiotherapy College Ranip - Ahemdabad. Certified in IASTM, Cupping, Swiss Ball Therapy and MET

Dhara Vaghela, MPT (Rehabilitation Science) Guide and senior lecturer at Shree Swaminarayan Physiotherapy college Ranip- Ahemdabad. Certified in Mannual therapy for vertebral column, NDT, Taping and Aerobics instructor.