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Original Research Paper

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EFFECT OF BRAIN FITNESS PROGRAMME ON COGNITION AND QUALITY OF LIFE AMONG SENIOR CITIZENS RESIDING IN OLD AGE HOMES: A PILOT STUDY

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ABSTRACT

Background: Indian population is facing an increase in proportion of elderly, which in future will increase the morbidity profile, if not dealt properly. The present study explored the feasibility of brain fitness programme among senior citizens staying at old age homes. **Methodology:** The study was conducted among senior citizens of age 60 years and above residing in two selected old age homes of Ernakulam district. Out of the 40 senior citizens screened, 22 participants who fulfilled the research criteria were included in the study. The two old age homes were randomly assigned to experimental and control group using lottery method. A total of 16 participants (seven from experimental group and nine from control group) completed the pilot study. Pre-assessment of participants were conducted using Montreal Cognitive Assessment (MoCA) and WHO Quality of life-OLD (WHOQOL-OLD). After the pre-assessment, the brain fitness programme was administered to the senior citizens of experimental group for ten consecutive weeks. The post-assessment was conducted following the intervention, and at 3 months following the first post-assessment using the same tools for both groups. **Results:** The data analysis showed a significant change in the scores of cognition, and quality of life between experimental and control group on post-assessment1 which was sustained on post-assessment2. Analysis using Friedman's test showed significant changes between pre assessment, post-assessment1 and post-assessment2 scores of cognition and quality of life among senior citizens of experimental group alone. **Conclusion:** Although the study results are promising, a large-scale study is necessary to establish the study outcome. The implementation of brain fitness programme was well received by the participants and the study was found to be feasible.

KEYWORDS : Brain fitness programme, cognition, quality of life, senior citizens, old age home

INTRODUCTION

Advancements in medical science and research have resulted in increased life span. Between 2001 and 2011, the growth in Indian elderly population has shot up to 36 per cent. State-wise data on elderly population divulge that Kerala has maximum proportion of elderly people in its population (Ministry of Statistics and Programme implementation, 2021).

According to Longitudinal Ageing Study in India (LASI) wave-1 report, 2020, cognition was lower among elderly aged 60 and above in comparison with older adults aged 45-59 years. Dementia among elderly will eventually lead to a crisis situation, as the burden of disease on the primary care providers is high (Rodríguez-González & Rodríguez-Míguez, 2020; Huang et al., 2022; Seidel & Thyrian, 2019; Spatuzzi et al., 2022). Studies also show that the quality of life is better among those elderly living with family compared to elderly in old age homes (Mankar et al., 2018; Kengnal et al., 2019; Simeão et al., 2018; Parmar et al., 2023)

Cognitive neuroscience is coming up with many scientific studies on the ways to tackle the issue of cognitive impairment among senior citizens like physical exercise, good sleep, nutrition, meditation, music, brain games and so on. These activities, thus helps in preventing cognitive decline and improving overall quality of life. Reviews have shown that multicomponent interventions are more effective than cognitive interventions alone (Brasser et al., 2022; Xiang & Zhang, 2023; Fotuhi et al., 2016; Finn & McDonald, 2011). Hence, the researcher planned to develop a brain fitness programme and to evaluate the effect of that programme on cognition, and quality of life among senior citizens residing in old age homes.

MATERIALS AND METHODS:

Study design and procedure:

The study was conducted among senior citizens of age 60 years and above residing in two selected old age homes of Ernakulam district. A total of 41 senior citizens were screened. Twenty-two senior citizens who fulfilled the research criteria were included in the study. The two old age homes were randomly assigned to experimental and control group using lottery method. A total of 16 participants (seven from experimental group and nine from control group) completed the pilot study.

For the experimental group, pre-assessment was conducted using MoCA and WHOQOL-OLD scale. After the pre-assessment the brain fitness programme was administered to the senior citizens for ten consecutive weeks. Brain fitness programme includes administration of meditation, music and cognitive training exercises. Meditation and music were administered on daily basis whereas the cognitive training exercises were administered thrice weekly. The post-assessment was conducted following the intervention, and at 3 months following the first post-assessment.

For the control group, after pre-assessment, post-assessment was conducted after ten weeks and at 3 months following the post-assessment1 without any intervention. For the participants in control group, an educational session on ways to improve cognition was implemented following the second post-assessment.

Administrative permission was obtained from the selected old age homes. Approval was also obtained from scientific review committee and institutional ethics committee. After providing adequate information regarding the study, consent was taken from the participants.

Measures:

The data of the participants were collected using the following measures:

Socio personal data sheet consisting of items seeking information about the background of participants such as age, gender, educational status, marital status, previous employment status, monthly income, source of income, duration of stay at old age home, reason for stay at old age home, frequency of visit by relatives, contact with relatives through phone, presence of medical problems, performance

of activities of daily living, recent stressful life events and history of cognitive impairment in relatives.

Montreal Cognitive Assessment (MoCA), a 30-point questionnaire that is used extensively in clinical and research settings to measure cognitive impairment. It includes tests of attention and concentration, executive functions, memory, language, visuoconstructional skills, conceptual thinking, calculations, and orientation.

WHOQOL-OLD scale comprising of 24 items, which measure the following facets: sensory abilities, autonomy, past, present and future activities, social participation, death and dying and intimacy.

Description Of The Intervention

Brain fitness programme has three components: meditation, music and cognitive training, which was administered for a period of 10 weeks. Mindful breathing meditation was administered daily in the morning, with the help of an audiotape in groups. Music was administered in groups daily for 30 minutes in late evening. Cognitive exercises were administered in small groups of 10-15 people, for a period of 10 weeks. The exercises were conducted three times in a week. Each week had a specific cognitive task to be completed with graded levels of difficulty.

RESULT:

Data Analysis:

Data were analysed using SPSS software using appropriate descriptive and inferential statistics. Socio-demographic variables were reported using frequency and percentage. Effectiveness of brain fitness programme was assessed using Friedmans ANOVA and Kruskal Wallis test. Interrelationship between cognition and quality of life was assessed using Spearman's rank correlation test.

Description Of Socio-personal Variables:

While majority of participants was males (85.71%) in experimental group, most of participants were females (66.67%) in control group. Majority of the participants (71.42%) of experimental group were in the age group of 70-79 years. In control group, 44.44% were in the age group of 60-69 years, 44.44% in the age group of 70-79 years and 11.12% in the age group of 80-89 years. Majority of participants from experimental (85.71%) as well as control group (77.78%) had schooling till 10th standard. Majority of experimental (77.78%) and control group (57.14%) participants were married and separated or widowed. Most of the participants from both experimental (42.86%) and control group (44.44%) were previously working as manual labourers. Most of the participants from experimental (57.14%) and control group (55.56%) reported that they never had any visit or got any phone call from their relatives. Diabetes was reported among 42.85% of experimental group and 33.33% of control group. Majority of experimental (85.71%) and control group (88.89%) participants were able to do activities independently. While majority (71.42%) of experimental group participants reported recent stressful life events, only 22.22% of control group experienced recent stressful life event.

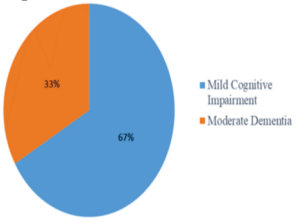

Figure 1. Distribution of senior citizens in control group based on cognition n=9

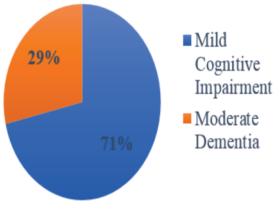

Figure 2. Distribution of senior citizens in experimental group based on cognition n=7

Description Of Cognition Of Senior Citizens:

Figure1 and Figure 2 clearly shows that majority of the participants from both experimental and control group had mild cognitive impairment. The median cognitive score was 21 for experimental group and 20 for control group, indicating that both groups are comparable.

Description Of Quality Of Life Of Senior Citizens:

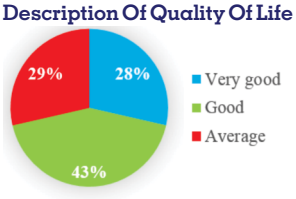

Figure 3. Distribution of senior citizens in control group based on quality of life n=9

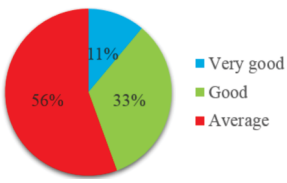

Figure 4. Distribution of senior citizens in experimental group based on quality of life n=7

As depicted in Figure 3 and Figure 4, most of the participants of experimental group had average quality of life, while most of the participants from control group reported good quality of life. The median score for quality of life as 99 for experimental group and 81 for control group.

Effectiveness Of Brain Fitness Programme On Cognition Of Senior Citizens Residing In Old Age Homes

Table 1. Median, U Value And P Value Of Cognition Among Senior Citizens In Control And Experimental Group N=16

Assessment	Group	N (samples)	Median	U value	P value
Post-assessment 1	Control group	9	20	0	0.00^{S}
	Experimental group	7	30		
Post-assessment 2	Control group	9	19	0	0.00^{S}
	Experimental group	7	30		

As the samples do not follow normal distribution, Mann Whitney U test was performed to check whether there was a significant change in the scores of cognition between experimental and control group on post-assessment 1 and post-assessment 2. Table 1 depicts the change in scores of cognition between experimental and control group. The data analysis showed that there was a significant change in the scores of cognition between experimental and control group on post-assessment 1 which was sustained on post-assessment 2 as well.

Table 2. Median, $\chi 2$ Value And P Value Of Cognition Among Senior Citizens In Control And Experimental Group n=16

Group	Assessment	Median	$\chi 2$ value	P value
Control group (n=9)	Pre-assessment	20	10.57	0.55^{NS}
	Post-assessment 1	20		
	Post-assessment 2	19		
Experimental group (n=7)	Pre-assessment	21	1.17	0.01^{S}
	Post-assessment 1	30		
	Post-assessment 2	30		

Table 2 depicts the changes in the scores of cognition at different points of time among experimental and control group assessed using Friedman's test. The data analysis revealed significant changes in the scores of cognition among participants in the experimental group alone.

Effectiveness Of Brain Fitness Programme On Quality Of Life Of Senior Citizens Residing In Old Age Homes

Mann Whitney U test was performed to check whether there was a significant change in the scores of quality of life between experimental and control group on post-assessment 1 and post-assessment 2. As depicted in Table 3, the data

analysis showed a significant change in the scores of quality of life between experimental and control group on post-assessment 1 which was sustained on post-assessment 2 as well.

Table 3. Median, U Value And P Value Of Cognition Among Senior Citizens In Control And Experimental Group n=16

Assessment	Group	N (samples)	Median	U value	P value
Post-assessment 1	Control group	9	80	0	0.00 S
	Experimental group	7	119		
Post-assessment 2	Control group	9	79	0	0.00 S
	Experimental group	7	119		

Table 4. Median, X2 Value And P Value Of Quality Of Life Among Senior Citizens In Control And Experimental Group N=16

Group	Assessment	Median	$\chi 2$ value	P value
Control group (n=9)	Pre-assessment	81	10.57	0.09 NS
	Post-assessment 1	80		
	Post-assessment 2	79		
Experimental group (n=7)	Pre-assessment	99	4.67	0.00 S
	Post-assessment 1	119		
	Post-assessment 2	119		

Table 4 depicts the changes in the scores of quality of life at different points of time among experimental and control group assessed using Friedman's test. The data analysis revealed significant changes in the scores of quality of life of participants in the experimental group alone.

Correlation Between Cognition And Quality Of Life Of Senior Citizens:

Table 5. ρ And P Value For Cognition And Quality Of Life Among Senior Citizens n=16

Variables	ρ	P value
Cognition, Quality of life	0.07	0.79 NS

As the data does not follow normal distribution, the relationship between cognition and quality of life was calculated using Spearman's Rank correlation. As described in Table 5, no correlation was identified between cognition and quality of life.

DISCUSSION:

The current study results are promising. The study proved that brain fitness programme made significant improvements in the scores of cognition and quality of life among senior citizens. Though the sample size was less, the study gives hope that brain fitness programme can improve the life of senior citizens.

Fotuhi et al., (2016) conducted a similar 12-week single-arm intervention trial of multi-disciplinary brain fitness program among elderly patients (n = 127) with a diagnosis of mild cognitive impairment (MCI). The brain fitness programme comprising of brain coaching/counselling for eating a Mediterranean diet, taking omega-3 supplements, increasing fitness and practicing mindfulness meditation, along with personalized cognitive stimulation and neurofeedback training produced statistically significant improvements in cognitive function of 84% of the patients. The study findings were supported with the help of MRI as well.

Meanwhile, another pilot study results of a randomized controlled trial on computerized cognitive training for older persons with mild cognitive impairment revealed no effect on self-reported everyday memory functioning, perceptions of memory controllability and depression, anxiety or stress. This study differs from the present study that the intervention included the cognitive training aspect alone which was implemented in computerised training sessions (Finn & McDonald, 2011).

There was a huge difference in the methodology used by various studies. Majority of the studies which were reviewed was unimodal. The multimodal interventional studies were heterogenous in the therapies used. Some studies used physical activity, vitamin/omega 3 supplementation or biofeedback along with cognitive training. Even for cognitive training, majority of the studies implemented computerised cognitive training, which may not be feasible in a developing country like India. The outcome measures also showed a wide variety. Hence it was hard to find studies which can compared with the present study.

CONCLUSION:

The current study was intended to assess the feasibility of a study assessing the effect of brain fitness programme on cognition, and quality of life among senior citizens residing in old age homes. The study concluded that brain fitness programme can be successfully implemented among senior citizens residing at old age homes. The intervention didn't cause any physical or psychological distress to the samples. The preliminary results were promising as the intervention produced significant improvement in the scores of cognition, and quality of life.

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