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**TO STUDY THE EFFICACY OF CHOREOGRAPH EXERCISE REGIMEN
VERSUS MULTI-MODAL EXERCISE REGIMEN ON COGNITIVE
ABILITIES, DEPRESSION, ANXIETY & STRESS, WITH QUALITY OF
LIFE IN OLDER PEOPLE**

PANCHAL S^{1*} AND PATEL GJ²

^{1,2}Ahmedabad Physiotherapy College, Opp. Kabir Enclave, Bopal Ghuma Road, Ghuma,
Ahmedabad- Parul University, India

***Corresponding Author: Dr. Sneha Panchal: E Mail: snehapanchal591998@gmail.com**

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ABSTRACT

Background: An increasing public health problem of stress, anxiety, depression, and cognitive impairment (CI) is being exacerbated by the ageing of the global population. They also experience a gradual loss of social skills and personality features, along with chronic medical and psychological issues. The purpose of the study was to evaluate the effects of choreograph-based exercise training vs multi-modal exercise training on psycho-behavioural symptoms, cognitive function, and quality of life in the senior population.

Methodology: A geriatric population over 60 was the subject of an experimental research in which participants were randomly assigned to two groups according to inclusion and exclusion criteria. Twenty individuals in Group A were trained in choreography, whereas twenty individuals in Group B were trained in multimodal exercises. The MMSE, DASS-21, and SF-36 were assessed post-intervention as study outcome measures. Analysis of the data was done using Microsoft Excel and SPSS.

Result: Both groups appear to have a substantial influence ($p < 0.05$) on all outcome measures, according to within-group analysis of the data. Data analyses conducted between groups indicated a significant effect ($p < 0.05$) on all outcomes with the exception of quality of life.

Conclusion: Both treatment approaches show significant effects individually. However, the choreographed exercise training shows more effect than Multi-modal Exercise Training.

Keywords: Choreograph Exercise Regimen, Multi-modal Exercise Regimen, Cognitive Abilities, Depression, Anxiety, Stress, Quality of life, Older People

INTRODUCTION

Indian seniors who are 60 years of age or older are referred to as "senior citizens" in India [1]. Approximately 75% of the world's elderly people currently reside in developing nations [2]. As people age, some cognitive abilities, including learning, memory, and executive functioning, deteriorate and become slower and less effective [3]. According to the World Health Organization (WHO), depression was the third-leading cause of disability worldwide by 2020 [3]. In community living settings, depression is common in older adults (60 years and older) [4]. A tiny assessment that evaluated older people's sedentary time objectively found that 67% of them spent more than 8.5 hours per day sitting [5]. Attention, verbal and nonverbal learning, short-term and working memory, visual and auditory processing, problem-solving, processing speed, and motor functioning are all examples of cognitive dysfunction [6]. Processing information requires the ability to pay attention. The quantity of information that

a human being can process at one time is limited. Long-term work at levels close to maximum capacity can be exhausting, especially for older persons [7]. One of the most common concerns among older persons is memory loss, which can lead to anxiety and psychological issues [8]. The ability of older adults to carry out daily duties, such as managing funds or prescriptions, navigating challenging surroundings, or learning something new, might be hampered by age-related decreases in cognitive capacities. The creation of strategies to successfully navigate the environment, perform routine household tasks, pick up new skills, and live independently requires a detailed understanding of these demands and how cognitive ageing impacts an older person's capacity to satisfy them [9]. Health across the lifetime is significantly influenced by behavioural and psychological characteristics, such as physical exercise, smoking, and other health-related behaviours, as well as cognitive

and social engagement, personality, and psycho-social stress [10]. Social aspects including interactions with others and one's financial situation have a significant impact on one's health and well-being. For instance, subjective feelings of loneliness are known to be a risk factor for serious functional declines and even death [11]. According to the WHO, quality of life (QOL) refers to a person's perspective of where they are in life about the culture and value systems they are a part of as well as their objectives, expectations, standards, and worries [12]. Reduced physical activity has been linked to higher levels of depression. More than one in six senior living residents suffer from anxiety and depression issues [2]. Exercise has been shown to increase cerebral blood flow, brain activity, and/or the acute activation of additional brain regions. Movement with music involves rhythmic movements of the limbs and trunk and music provides external cues that facilitate movement. Music with movement has been shown to encourage patients to develop attention, memory, rhythm, coordination, balance, and self-perception of the body in space [13]. The goal of the current study was to determine if multimodal exercise training and choreographed exercise training can help older adults with cognitive dysfunction, psycho-behavioural symptoms

and quality of life. Thus, the outcome may support the preservation of cognitive function, raises one's self-esteem and mood.

MATERIALS & METHOD

The study was conducted after obtaining institutional ethical authorization. The Nirant Old Age Home in Adalaj, Gandhinagar, provided the information. The populations were distributed using a basic random sampling approach. Forty geriatric groups with cognitive impairment psycho-behavioural alterations and impaired quality of life were the subjects of a comparative investigation. Training in choreographed exercises was given to Group A (n = 20), whereas training in multi-modal exercises was given to Group B (n = 20). Thea-band (GREEN/RED), Wobble board, MMSE, DASS, SF36, Pen, Paper, Consent Form was used in current study. The study's inclusion requirements required one to be 60 years of age or older. Both genders, MMSE scores 18–30, DASS scores 10–13 for depression, 8–9 for anxiety, and 15–18 for stress. Lack of mental illnesses (such as dementia, schizophrenia, or significant depression) [3, 14, 15]. The research included the following exclusion criteria: speech abnormalities, hearing or vision impairment, history of brain damage (such as cerebrovascular illness), and presence of severe cardiovascular disease

(such as heart or respiratory failure) [3, 14, 16]. A comparative study was conducted and all the subjects were divided into two groups by simple random sampling method. Group A (n=20) received Choreograph exercise training and Group B (n=20) received Multi-model exercise training. Each group received intervention for 5 days per week for 20 sessions. Pre- and post-outcome measures were assessed using MMSE, DASS & Sf-36. The duration of the session was divided as follows: The entire session lasted sixty minutes. Ten minutes were dedicated to the warm-up, which included exercises such as head movement, side bending, turning, and stepping. Ten minutes were also dedicated to the cool-down, which included activities like slow shoulder movement, stepping, and breathing exercises [4, 9].

Group A Choreograph Exercise training group: Twenty people were told to adhere to

the lesson. Metronome rhythms were used in the video that the choreographer and physiotherapist created. There were 40 minutes in the video. For visual assistance, a choreography movie was displayed on a screen. The physiotherapist repeated the steps and instructed at the same time.

Sessions of Choreographed Exercise Training for Trainers always had the same format: 1) Acquiring the steps: After observing the music-free teaching films and according to the physiotherapist's directions, the participants acquired the steps in segments; 2) Executing the choreography: After practising the moves, the participants made four or five attempts at seeing the music-accompanied choreographed movie; 3) Music help alone: Using only the music on one try, participants replicated the learning stages in order without any visual assistance. Exercise training given in **Table 1** [5, 13, 14, 17].

Table 1: Included all the exercises which were provided to the participants in group A

Exercise training (Deep Breathing Exercises (3 Repetitions) was included at the end of all movements.)	
Sitting: Cervical flexion-extension, Cervical side flexion,	All the movement was for 7 times and breathing exercise was added after each completion of movement.
Sitting: Y, T, W,	
Sitting: Shoulder abduction, flexion-extension, Retraction	
Sitting: Trunk Rotation	
Sitting: Knee extension	
Sitting: Hip flexion	
Standing: Marching, heel up	
Sidewalk	

Group B was Multi-modal Exercise training:

For 20 min warm-up and cool-down activities and 40 minutes of physical exercise. The first week's protocol involved stable sitting balance, flexibility, and strengthening; the second week featured flexibility, coordination, and resistance training. In the third week, focus on strengthening and

balance training; in the fourth week, focus on gait training, coordination exercises, and resistance training. As the week goes on, the number of repetitions in strengthening exercises like the calf raise, abdominal crunch, and back extension rises to one set of ten. Exercise shown in **Table 2** [5, 17, 18, 19].

Table 2: Included all the exercises which were provided to the participants in group B

S. No.	Exercise	Name of exercise	Repetition
1	Strengthening Exercise	Calf Raise, Abdominal Crunch, Back Extension.	1 set of 10 Repetitions as week increases set increases
2	Flexibility Training	Hamstring Stretch, Calf Stretch, Quadriceps Stretch, Neck Stretch	30-60 sec, 2-4 Repetitions
3	Coordination Exercise	Bridging (10 Repetitions) Sit to stand (5Repetitions).	
4	Resistance Training	Standing Hip Abduction, Side lying Clam Shell, Y & T Positions, and Wall Push up.	(2 sets 8 Repetitions)
5	Stable Sitting Balance	Trunk Rotation	3sets 4-5 repetitions
6	Balance Training	Marching, Wobble board exercise	10 minutes
7	Exercise in standing	Tandem standing, Standing on one leg	15-20minutes
8	Gait training	Stepping up and down on one step platforms, Returning walking backwards, Tandem walkingSide walking	15-20 minutes

RESULTS

The SPSS version 26 and Microsoft Excel were used for the analyses of data. The Shapiro-Wilk test was used to check the normality. Student paired t-test and independent t-test were applied to compare

the mean and standard deviations of the inter and intra-group analyses. The Confidence Interval for the study was kept at 95%. The significance level was kept at <0.05. The present study was used different statistical tests which shown in following **Table 3**.

Table 3: Statistical Tests for The Present Study

	Group A	Group B
Mean	78.15	75.6
SD	6.69	6.57
Gender		
Male	3	6
Female	16	14

Table 4: Age and Gender Distribution in Different Groups

Variables	Group A		Group B		p
	Mean	SD	Mean	SD	
MMSE	22.25	2.65	22.75	3.12	0.529
Depression	14	2.17	15.35	2.25	0.072
Anxiety	11.55	2.11	11.9	1.68	0.535
Stress	17.15	3.55	18.55	3.18	0.189
SF-36	85.95	14.40	95.05	14.44	0.043

A baseline comparison of all outcome measures did not show a significant value of $p < 0.05$. all the outcomes were greater than 0.05 except SF-36 which was 0.043 ($p < 0.05$)

Table 5: Comparison of All Outcomes in Group A (Within)

Group A	Mean	SD	t
MMSE pre	22.25	2.65	<0.01
MMSE post	26.3	2.43	
Depression pre	14	2.18	<0.01
Depression post	9.1	2.61	
Anxiety pre	11.55	2.11	<0.01
Anxiety post	6.05	2.04	
Stress pre	17.15	3.56	<0.01
Stress post	11.4	3.86	
SF-36 pre	85.95	14.40	<0.01
SF-36 post	109.95	15.73	

Within the group, A comparison of all outcome measures suggested a less than 0.01 value which was lower than the significant value of 0.05. Hence, the group intervention was effective.

Table 6: Comparison of All Outcomes in Group B (Within)

Group B	Mean	SD	t
MMSE pre	22.75	3.13	<0.01
MMSE post	26.8	3.40	
Depression pre	15.35	2.25	<0.01
Depression post	12.85	2.25	
Anxiety pre	11.9	1.68	<0.01
Anxiety post	9.4	1.67	
Stress pre	18.55	3.19	<0.01
Stress post	15.15	3.31	
SF-36 pre	95.05	14.45	<0.01
SF-36 post	106.15	13.68	

Within the group, B comparison of all outcome measures suggested a less than 0.01 value which was lower than the significant value of 0.05. Hence, the group intervention was effective.

Table 7: Comparison of All Outcomes in Both Groups (Between)

Variables	Group A		Group B		t
	Mean	SD	Mean	SD	
MMSE	26.03	2.43007	26.8	3.39659	0.04
Depression	9.1	2.61373	12.85	2.25424	<0.001
Anxiety	6.05	2.03845	9.4	1.66702	<0.001
Stress	11.4	3.85801	15.15	3.31305	0.002
SF-36	109.95	15.72954	106.15	13.67778	0.42

t-test. Statistical analyses of the data suggested statistically significant differences between group analyses for MMSE, DASS-21 except SF-36 ($p = 0.42$).

DISCUSSION

The present study was designed to find out the effectiveness of Choreograph-exercise training versus multi-modal exercise training on cognitive function, psycho-behavioural

symptoms and quality of life in a geriatric population. An experimental design was implemented for two months. Outcome measures were a Mini-mental state examination (MMSE), Depression, anxiety

and stress scale 21 Items (DASS-21), 36 Item short form of Health Survey (SF-36). After two months, a re-assessment of all outcome measures was carried out. In Group A (a total number of participants 20 in a group), Choreograph-exercise training was given. Meanwhile, in Group B (a total number of participants 20 in a group), Multi-modal exercise training was given. A baseline data comparison was made for the two groups for the age, gender and all outcome measures. The significant value for age difference was 0.194, for MMSE was 0.529, for depression was 0.072, for anxiety was 0.535, for stress was 0.189, and for SF 36 was 0.043. The groups were found to be similar in all aspects which suggested that the differences in the outcome measures in all groups after the interventions can be attributed solely to the given intervention to the particular group. The results from this study showed statistically significant improvements in terms of the MMSE, DASS-21, and SF-36 post-intervention of 2 months. The result of the present study shows that within-group analysis of Choreograph-exercise training and multi-modal exercise training shows a statistically significant improvement in cognitive function ($p < 0.05$), psycho-behavioural ($p < 0.05$), and quality of life ($p < 0.05$) post-intervention. The choreograph-

exercise training intervention significantly improved global cognition. It is an integrative mind-body therapy that provides support for older with cognitive impairment [20]. Choreograph-exercise training requires body movements, following a special rhythm and music. A possible mechanism is that biomechanical movements with music stimulate the parietal lobes of the brain, provide somatosensory inputs (which increase neurotrophic factors), and improve global cognition and visuospatial function [21]. This multimodal exercise program had a pronounced beneficial effect on tests of physical and cognitive performance and peripheral blood concentrations. Enhanced verbal fluency and information processing speed and a better ability to attend, concentrate, think flexibly and resist distraction. This is important since these particular cognitive functions are amongst those most associated with age-related decline [22]. An improvement in cognitive performance might be due to increased brain functioning and brain volumes, which occurred after controlled physical exercise training and increased release and synthesis of neurotrophic factors might be linked to better cognitive function and reduce depressive symptoms in psychiatric patients [23]. Changes in the neurotransmitter release as a

function of physical exercise, such as serotonin, are suggested to be related to a decrease in depressive symptoms in diverse psychiatric disorders. To round it off, reduced inflammatory markers might influence the progression of the illness, as chronic inflammation, mediated by cytokines, was suggested to play an important role as a risk factor for neurodegenerative diseases, mood and psychotic disorders [24]. The between-group analysis did show a statistically significant difference in cognitive function ($p= 0.04$), depression ($p<0.05$), anxiety ($p<0.05$), and stress ($p<0.05$). However, the quality of life did not show a statistically significant difference ($p= 0.42$). The improvement in cognitive function, psycho-behavioural function and quality of life between the groups could be attributed to the mechanism explained above. The present study suggested that within-group analysis of all outcomes showed a statistically significant effect on all outcome measures. However, the between-group analysis of data did not show a statistically significant effect on quality of life. Thus, the experimental hypothesis was accepted for MMSE and DASS-21 ($p < 0.05$) but the Null hypothesis was accepted for SF-36 ($p = 0.42$) while analysing the between groups.

CONCLUSION

The current investigation found that each of the two forms of treatment is successful on its own. However, in terms of lowering cognitive dysfunction, increasing psycho-behavioural improvements, and enhancing quality of life, choreograph-exercise training works more effectively than multimodal exercise training.

Ethics: On 22nd February 2023, The research was approved by the Institutional Ethics Committee for Human Research Sainath Hospital, Ahmedabad (IECHR-Sainath Hospital). With Approval Number: IECHR-SAINATH HOSPITAL/AHMC/73.

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