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Original Article

Enhancing motor fitness in the elderly: The impact of structured functional training program

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Abstract
In this study, we aimed to evaluate the effectiveness of a 12-week structured functional training program on various aspects of physical fitness in different age groups within the elderly population, including active adults (aged 50–59 years) and geriatric individuals (aged 60 years and above). The interventions targeted leg strength and endurance, static and dynamic balance, aerobic capacity, and upper and lower body range of motion. The structured training program incorporated multiple fitness components; including core strength, balance and stability for fall prevention, mobility and flexibility, and multipoint exercises. The experimental groups, consisting of both active adults and geriatric participants, underwent the 12-week training program, which was then compared to respective control groups. The data was collected at three time periods pre (0 week), mid (6 week), and post (12 week) after successfully following the structured training program. The statistical analysis included the Shapiro-Wilk normality test, descriptive analysis (mean ± SD), inferential analysis (2*3*2 repeated measure ANOVA), followed by the effect size (Cohen's D and partial eta square).The result showed a significant improvement in (p - .000) Leg Strength & Endurance (Chair stand test), Static balance (flamingo balance test) (p - .000), aerobic capacity (2-minute step test) (p - .000), Range of motion; lower back and hamstring (sit and reach test) (p - .000), back scratch test (Range of motion of upper body and shoulder)(p - .000), and dynamic balance (four square step test) (p - .000). The magnitude of significance was recorded medium to large. The study provides compelling evidence for the effectiveness of structured motor fitness programs in enhancing physical performance among elderly populations. It is recommended that such interventions are essential for advancing in the field of elderly fitness and optimizing health outcomes.
Keywords: dynamic balance, stability, mobility, geriatric, active adults.

Introduction:

As the global population ages, there is a growing emphasis on promoting and maintaining the health and well-being of the elderly (Galhardas, L., Raimundo, A., Del Pozo-Cruz, J., & Marmeleira, 2022). Autonomy and quality of life in old age are greatly enhanced by maintaining motor fitness, an important but frequently disregarded factor. With this in mind, a viable approach to improving motor fitness in the aged population is the adoption of an organized functional training program (Buchner, D. M., & Wagner, 1992); (Vandervoort, 2002). The benefits and results of a targeted and methodical approach to functional training are examined in this article, which dives into the significant influence that such a programme may have on older people's physical health. A population of older people who are healthier and more active can be achieved by comprehending the subtleties of this strategy and its consequences (Colussi et al., 2019), (Lin et al., 2019).

Although the terms "motor fitness" and "physical fitness" are sometimes used interchangeably, the former was meant to refer to aspects of physical fitness that go beyond the fundamentals and exclude the many neuromuscular coordination abilities that make up general motor ability. Because motor fitness considers the effectiveness of fundamental motions, it includes aspects like strength, speed, agility, and balance (Musich S., Wang S. S., Hawkins K., 2017) (Barrow & Harold, 1983) mentioned that the greatest rivalry of all is life these days. It must be managed with a certain amount of delight and success. It needs the kind of power, endurance and resistance to stress and strain that only a physically healthy body can offer. Because of the artificial life that contemporary civilization encourages, in which physical exertion is minimised and living is made as soft and comfortable as possible, people in civilised communities lack strength and endurance (Dumith S. C., Hallal P. C., Reis R. S., 2011). The average man tends to his cars more often than he tends to his own machine, which is his body. A physically fit person is emotionally stable, mentally sharp, and socially adapt. He has confidence in his ability to handle life's daily challenges (Joubert *et al.* 2007). He takes on a cheerful and upbeat outlook on life. Physical health is the cornerstone of all excellence.

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One particularly successful approach to improving motor fitness in the elderly is through structured functional training programmes, which target the various facets of physical health that are essential for ageing in a healthy way (Colussi et al., 2019). The beneficial effects of these program on numerous motor fitness domains have been repeatedly supported by research. The significance of these therapies is highlighted (Marín-Jiménez, N., Cruz-León, C., Perez-Bey, A., Conde-Caveda, J., Grao-Cruces, A., Aparicio, V. A., Castro-Piñero, J., & Cuenca-García, 2022) in reducing age-related declines in strength, power, and balance, especially in the upper limbs. Moreover, (Nagasaki, H., Itoh, H., & Furuna, 1995) and (Liu-Ambrose, T., Donaldson, M. G., Ahamed, Y., Graf, P., Cook, W. L., Close, J., & Khan, 2010) showed that varied exercise regimens greatly increase older individuals' mobility and balance, which enhances their motor skills overall. These entire studies highlight the promise of structured functional training as a complete and focused strategy to prevent age-related decreases in motor fitness in the elderly and promote a more active and healthy ageing process (Vandervoort, 2002).

Systematic physical activity and exercise are more beneficial than pharmaceutical interventions for all older people, fit or frail, since they increase the quality of life, functionality, independence, and psychological well-being as well as lower mortality and non-communicable chronic diseases (Das P., 2012) that tries to control fragility by focusing on individual systems. Furthermore, among the elderly, falls are the leading cause of hospitalization and fatal injuries. It has been demonstrated that physical activity programmes like functional training (FT), which emphasize balance, strength, endurance, gait, and physical function training, are more successful at lowering the risk of falls-related injuries and fractures in the elderly (Lautenbacher, 2012). Due to its potential to increase functional ability, reduce pain perception, and promote physical fitness, functional training has gained popularity among this group on a global scale (Thompson, 2023). Thus, this research aimed to ascertain the impact of a 12-week structured functional training program on elderly individuals.

Programs for structured functional training provide an individualised strategy to meet the unique requirements of senior citizens in terms of preserving and improving their motor skills. Typically, these programs incorporate exercises that target the muscle areas and motor skills necessary for functional independence, simulating and improving activities of daily living (Metter, E. J., Conwit, R., Tobin, J., & Fozard, 1997). Functional training seeks to offer an all-encompassing strategy for enhancing general motor fitness in the elderly by emphasising elements like strength, balance, and coordination (Orr, R., de Vos, N. J., Singh, N. A., Ross, D. A., Stavrinos, T. M., & Fiatarone-Singh, 2006). The effectiveness of systematic functional training programmes in improving older people' motor fitness is supported by current research. For instance, compared to a control group, older persons enrolled in a multimodal fitness programme showed significant gains in balance and mobility in a randomized controlled trial conducted by Liu-Ambrose et al. Similar to this, a meta-analysis conducted in 2013 by (Cadore, E. L., Rodríguez-Mañas, L., Sinclair, A., & Izquierdo, 2013) showed that resistance training therapies improved elderly people's muscle strength and functional ability.

Even with the increasing amount of data demonstrating the advantages of structured functional training, thorough studies into the precise impacts of these programmes on different facets of motor fitness in the elderly are still required (Smith, J. R., Johnson, A. B., & Davis, 2020). It has been demonstrated that insufficient physical activity leads to a physical decline that eventually results in functional restrictions in everyday activities that are necessary for independent functioning, like lifting, stooping, walking, and climbing stairs (Rikli 2005). The effects of exercise frequency also need to be further investigated, even though the need and development of age-appropriate tools to evaluate the physiological attributes (strength, endurance, flexibility, agility, and balance) required in performing activities of daily living have been somewhat explored (Marques, A., Rosa, M., Soares, P., Santos, R., Mota, J. and Carvalho, 2011) (Wilkin, L. D. and Haddock, 2011). After engaging in a strength training programme twice a week for 12 weeks, older persons showed significant gains in their strength (Brown, M. and Holloszy, 1993). Dynamic balance gains were noted by (Wolfson, L., Whipple, R., Derby, C., Judge, J., King, M., Amerman, P. and Smyers, 1996) after participants in a 12-week training programme met three times a week. Additional research shows that exercising twice a week or more can result in significant changes (ChinA., Paw M. A., Paw M., van Poppel, M., Twisk, J. and van Mechelen, 2004). The frequency of exercise recommended for individuals 60 years of age and above to increase their motor fitness levels, however, has not been the subject of much research (Nakamura, Y., Tanaka, K., Yabushita, N., Sakai, T. and Shigematsu, 2007). Here are some key aspects of motor fitness and its relevance to older adults:

- Balance and Coordination: As people age, balance and coordination tend to decline, leading to an increased risk of falls and injuries.
- Flexibility: Aging often results in a decrease in joint flexibility, which can impact mobility and daily activities.
- Strength: Muscle mass and strength decline with age, affecting overall functional capacity and independence.
- Endurance: Cardiovascular endurance is crucial for daily activities and maintaining a healthy heart and lungs.
- Reaction Time: Slower reaction times are common as people age, affecting the ability to respond quickly to stimuli.
- Mobility: Maintaining mobility is essential for independence and the ability to perform activities of daily living.

- Joint Health: Older adults may experience joint stiffness and discomfort, impacting overall mobility.

Physical Interventions for Active Adults (50-59 years): When people enter the stage of active adulthood, physical health becomes more important. Frequent exercise is essential for enhancing well-being and health. According to guidelines from the American College of Sports Medicine and the American Heart Association for enhancing cardiovascular health and general physical well-being, (Nelson, M. E., Rejeski, W. J., Blair, S. N., Duncan, P. W., Judge, J. O., King, A. C., & Castaneda-Sceppa, 2016) underlined the significance of exercise. This emphasises how important it is for active adults to get focused physical therapies to guarantee a smooth transition into later life stages. Geriatric Individuals (60 years and above): Elderly people frequently worry about cognitive deterioration, thus programmes that focus on cognitive health are essential. The efficacy of cognitive training programmes in improving memory, attention, and executive skills in older persons was shown by (Ball, K., Berch, D. B., Helmers, K. F., Jobe, J. B., Leveck, M. D., Marsiske, M., & Willis, 2002) in their ACTIVE study. These cognitive therapies emphasise the need for specialised solutions to address cognitive problems associated with ageing and serve a critical role in maintaining mental acuity and quality of life for geriatric adults.

The primary objective of this research was to investigate the impact of a structured functional training program on the motor fitness assessment of elderly adults. Through an experimental study, the study aimed to assess the effectiveness of functional exercises in improving key components of motor fitness, including balance, coordination, flexibility, strength, and overall functional capacity to contribute to evidence-based practices in geriatric care and inform the development of targeted exercise programs for older adults, and ultimately promote a healthier and more active aging process.

Materials & Methods

The materials and methods part explains the test organization and statistical procedure followed for the data collection methods, tools, and the analysis of the data relative to the functional training.

The study involved a total of 60 participants from Pune city, comprising two distinct cohorts: active adults (n = 30) and geriatric individuals (n = 30). Within each cohort, participants were randomly assigned to either the experimental or controlled group, resulting in 15 participants per group. The experimental groups underwent a 12-week structured functional training program targeting various aspects of motor fitness, overseen by qualified fitness trainers. In contrast, the controlled groups engaged in recreational activities during the designated time frames. Data were collected at baseline (0 week), midpoint (6 weeks), and post-intervention (12 weeks) using standardized assessments measuring protocol for strength, flexibility, balance, and mobility.

Normality of the data set was ensured through the Shapiro – Wilk Test ($p < 0.05$) and statistical analysis, including mean, and standard deviation to describe the dataset, Cohens'd was used to test the magnitude of significance and was interpreted as trivial (0.6-1.2), large (>1.2-2.0), very large (>2.0-4.0), and extremely large (>4.0) (Hopkins et al., 2009). The rate of change (Δ%) was also calculated following the equation: $[(\text{Mean}_{post} - \text{Mean}_{pre}) * \text{Mean}_{pre}] * 100$ to interpret the change in means at different point sets (pre to mid, mid to post, and pre to post). The effectiveness of the 12-week functional training program in different groups was measured through 2*3*2 repeated measure ANOVA ($p > 0.05$). The magnitude of significance: partial eta square (ηp^2) was used and interpreted as small (0.01), medium (0.06), and large (0.14) (Richardson, 2011). Ethical considerations, (The IEC Report dated 27th March 2023 was taken into consideration and approved from the Institutional Ethics Committee, Bharati Vidyapeeth (DTU) College of Physical Education, Pune), including informed consent and confidentiality, were prioritized throughout the study. Acknowledging potential limitations such as sample size and generalizability, the study aimed to provide valuable insights into the effects of a 12-week functional training program on active adults and geriatric individuals.

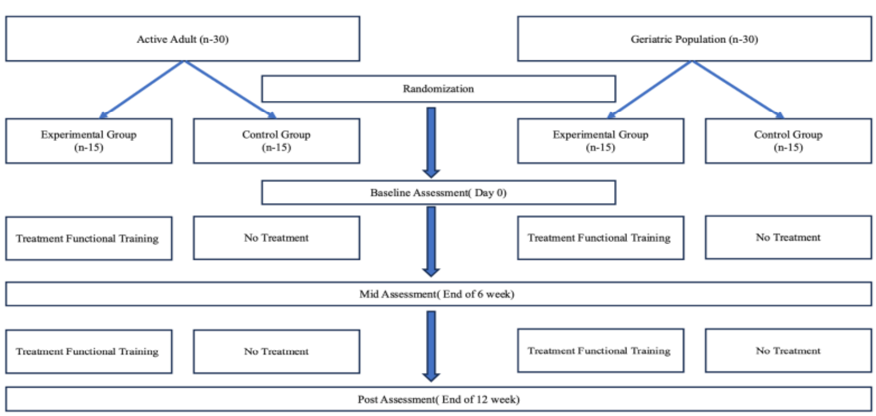

Figure 1 : *Semantic representation of the organization of the study*

Table 1: *Description of the dependent variable.*

Test Name	Tools	Objective	Measurement Units
Chair Stand Test	Chair without armrests and Stopwatch	Leg Strength & Endurance	Nos.
Flamingo balance test	Stopwatch	Static Balance	Seconds
2- minute step test	Stepper (30 cm) armrests and Stopwatch	Aerobic capacity	Nos.
Sit and reach test	Sit and reach box	Range of motion; lower back and hamstring	Centimetres
Back scratch test	-	Range of motion; upper body and shoulder	Centimetres
Four square step tests	Stopwatch, 4 canes/rods	Dynamic Balance	Seconds

1. Chair Stand Test: The test is to be performed with seated squats with the help of a chair. The no. of proper sit and stand in 30 seconds time-frame was counted. The test was implemented to primarily measures the leg strength and endurance of the elderly population

2. The 2-Minute Step test

It involves stepping up and down on a raised platform or step while maintaining a set rhythm for two minutes. The number of complete steps was counted.

3. Balance test : The test is to be performed with one leg lifting from the ground either hanging on air or placing laterally to the other leg for 30 seconds. The no. of falls or imbalanced stages were counted.

4. Flexibility:A simple test, pushing the slider on the sit and reach box while sitting down on the ground with feet straight without bending the knees. The furthest distance reached while maintaining proper form was measured in centimeters.

5. The Back Scratch Test : The shoulder mobility test was measured by touching alternating fingertips from above and below the shoulder level. The distance between the fingertips was measured in centimeters.

6. The Four-Square Step Test :Place four squares on the ground, each measuring approximately 60 cm x 60 cm (24 inches x 24 inches). Arrange them in a square shape, with about one meter (or three feet) of space between each square. The subjects now walk forward, backward, and lateral while maintaining balance and posture. The time is recorded in completing the full round without making any fault or fall.

Table 2: *Description of the independent variable; functional training intervention* **;** *Frequency of treatment -5 days/week, Volume - 1-hour, total duration - 3 months*

Exercise Category	Specific Exercises	Targeted Objectives
Core Strength	Plank variations, bridges, standing cable rotations	Develop core strength for stability and balance
Balance and Stability/ Fall Prevention	Single-leg stands, yoga poses, balance board exercises	Improve body control, reduce the risk of falls
Mobility and Flexibility	Dynamic stretching, yoga flows, exercises with resistance bands	Enhance joint mobility, maintain range of motion
Multi-Joint Movements	Squats, lunges, push-ups, rows	Engage multiple muscle groups simultaneously
Functional Training Equipment	Stability balls, resistance bands, medicine balls, kettlebells, TRX	Enhance functional exercises with various equipment
Everyday Movements	Lifting and carrying groceries, getting up from a chair, climbing stairs, reaching overhead	Improve movements in daily life
Agility-COD and Coordination	Ladder drills, cone exercises, agility ladder workouts	Enhance overall motor skills and body control
Cardiovascular Conditioning	Brisk walking, cycling, aerobic classes	Include cardiovascular exercises for overall fitness

Statistical Analysis

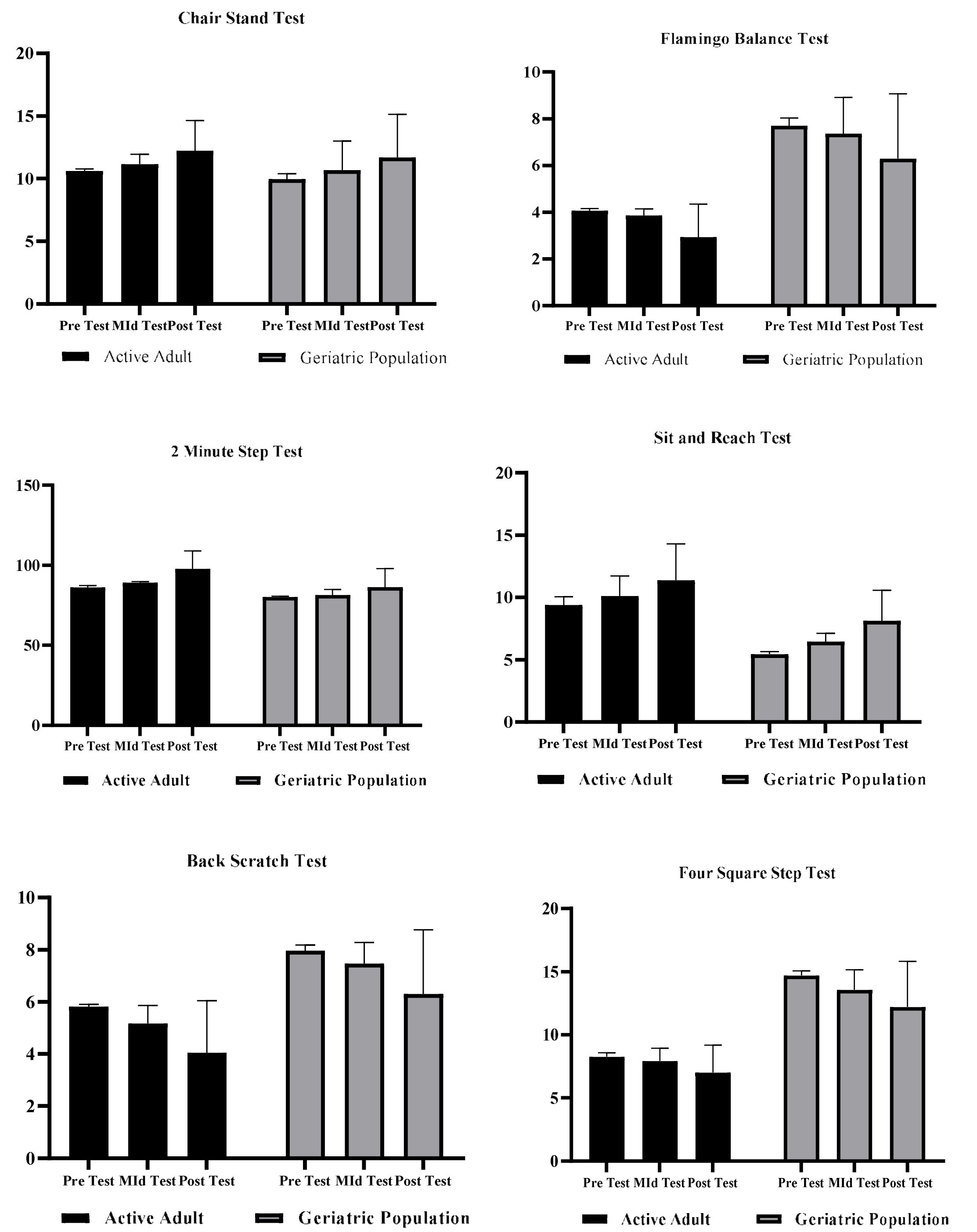

Figure 2: *Graphical representation of the changes recorded in active adult and geriatric population, at baseline, mid and post-functional training intervention.*

Table 3: *SD – standard deviation, ES – effect size, Δ% - percentage change, ηp² – partial eta square, MI – medium improvement, LI – large improvement, TI – trivial improvement, SI – small improvement*

			Mean [SD]			Pre to Mid		Mid to Post		Pre to post		2*3*2 Repeated Measure ANOVA			
												Time *Group		Time*Group*Age	
		Group	Pre	Mid	Post	(ES)	(Δ%)	(ES)	(Δ%)	(ES)	(Δ%)	P value	(ηp^2)	P value	(ηp^2)
2.1 Chair Stand Test	Active Adult	Experiment Group	10.53 [2.38]	11.73 [1.90]	13.93 [1.83]	0.56 (MI)	1.2	1.18 (LI)	2.2	1.60 (LI)	3.4	**.000***	.230	.620	.009
		Control Group	10.73 [2.05]	10.60 [2.66]	10.53 [2.69]	0.05 (TI)	0.13	0.03 (TI)	0.7	0.08 (TI)	1.9				
	Geriatric Group	Experiment Group	10.26 [2.73]	12.33 [2.19]	14.13 [2.13]	0.84 (LI)	2.07	0.83 (LI)	1.8	1.58 (LI)	3.87				
		Control Group	9.66 [2.43]	9.06 [2.21]	9.26 [2.73]	0.26 (SI)	0.6	0.08 (TI)	2.2	0.15 (TI)	0.4				
2.2 Flamingo Balance Test	Active Adult	Experiment Group	4.00 [1.46]	3.66 [1.23]	1.93 [1.03]	0.25 (SI)	0.34	1.53 (LI)	1.73	1.64 (LI)	2.07	**.000***	.224	.178	.030
		Control Group	4.13 [1.45]	4.06 [1.38]	3.93 [1.33]	0.05 (TI)	0.07	0.10 (TI)	0.13	0.14 (TI)	0.2				
	Geriatric Group	Experiment Group	7.46 [1.64]	6.26 [1.75]	4.33 [1.63]	0.71 (MI)	1.2	1.14 (LI)	1.93	1.91 (LI)	3.13				
		Control Group	7.93 [2.01]	8.46 [1.80]	8.26 [2.25]	0.28 (SI)	0.53	0.10 (TI)	0.2	0.15 (TI)	0.33				
2.3 - 2 Minutes Step Test	Active Adult	Experiment Group	85.26 [5.13]	89.66 [6.34]	105.73 [6.55]	0.76 (MI)	4.4	2.49 (LI)	16.07	3.48 (LI)	20.47	**.000***	.597	.410	.016
		Control Group	87.00 [4.65]	88.73 [6.94]	89.80 [8.75]	0.29 (SI)	1.73	0.14 (TI)	1.07	0.40 (SI)	2.8				
	Geriatric Group	Experiment Group	80.53 [6.67]	83.93 [5.93]	94.53 [6.89]	0.54 (MI)	3.4	1.65 (LI)	10.6	2.06 (LI)	14				
		Control Group	79.93 [6.04]	78.86 [4.29]	78.13 [3.99]	0.20 (SI)	1.07	0.18 (TI)	0.73	0.35 (TI)	1.8				
2.4 Sit and Reach Test	Active Adult	Experiment Group	9.86 [2.50]	11.26 [2.43]	13.46 [2.19]	0.57 (MI)	1.4	0.95 (LI)	2.2	1.53 (LI)	3.6	**.000***	.222	.802	.004
		Control Group	8.93 [2.78]	9.00 [2.50]	9.33 [2.66]	0.03 (TI)	0.07	0.13 (TI)	0.33	0.15 (TI)	0.4				
	Geriatric Group	Experiment Group	5.60 [2.32]	6.93 [2.34]	9.86 [2.41]	0.57 (MI)	1.33	1.23 (LI)	2.93	1.80 (LI)	4.26				

			Mean [SD]			Pre to Mid		Mid to Post		Pre to post		2*3*2 Repeated Measure ANOVA			
												Time *Group		Time*Group*Age	
		Group	Pre	Mid	Post	(ES)	(Δ%)	(ES)	(Δ%)	(ES)	(Δ%)	P value	(ηp^2)	P value	(ηp^2)
		Control Group	5.33 [2.41]	6.00 [2.32]	6.40 [2.72]	0.28 (SI)	.67	0.16 (TI)	0.4	0.42 (TI)	1.07				
2.5 Back Scratch Test	**Active Adult**	Experiment Group	5.77 [0.66]	4.68 [0.61]	2.64 [0.92]	1.72 (LI)	1.09	2.61 (LI)	2.04	3.91 (LI)	3.13	**.000***	.395	.391	.017
		Control Group	5.88 [1.07]	5.66 [1.53]	5.46 [1.37]	0.17 (TI)	0.22	0.14 (TI)	0.2	0.34 (SI)	0.42				
	Geriatric Group	Experiment Group	8.12 [1.32]	6.90 [1.68]	4.57 [1.87]	0.81 (LI)	1.22	1.31 (LI)	2.33	2.19 (LI)	3.55				
		Control Group	7.82 [1.81]	8.04 [1.76]	8.04 [1.90]	0.12 (TI)	0.22	0.00 (TI)	0	0.12 (TI)	0.22				
2.6 Four Square Step Test	**Active Adult**	Experiment Group	8.02 [1.56]	7.21 [1.22]	5.47 [0.88]	0.58 (MI)	0.81	1.64 (LI)	1.74	2.01 (LI)	2.55	**.000***	.469	**.002***	.107
		Control Group	8.48 [1.42]	8.63 [1.20]	8.56 [1.31]	0.11 (TI)	0.15	0.06 (TI)	0.07	0.06 (TI)	0.08				
	Geriatric Group	Experiment Group	14.97 [2.40]	12.46 [1.86]	9.64 [1.19]	1.17 (LI)	2.51	1.81 (LI)	2.82	2.81 (LI)	5.33				
		Control Group	14.44 [3.09]	14.69 [2.12]	14.76 [2.13]	0.09 (TI)	0.25	0.04 (TI)	0.07	0.14 (TI)	0.32				

Results

The mean ±SD of active adult and geriatric population for chair stand, flamingo balance, 2-minute step test, sit and reach, back scatch, and four-square step test is shown in [Table 3-2.1].

Chair Stand Test

Significant group-by-time interaction was found, hence the structured functional training significantly improves (p - .000, ηp^2 - .230) leg strength and endurance in the experimental groups of active adult and geriatric population. Although the time*group*age interaction was found insignificant (p-.620), hence the age has no interaction and both the groups similarly improved irrespective of the age difference. The effect of magnitude (Cohen's d) for the chair stand test in the treatment group of active adults had increased from medium to large, whereas, the control group was found constant at trivial effect. Similarly, the experimental group of the geriatric population shows large effect and in contrary the control group reduced from small to trivial effect, when compared at pre to mid, mid to post and pre to post [Table 3 - 22].

Flamingo Balance Test

The significant interaction of time by group was observed (p - .000, ηp^2 - .224), hence the structured functional training significantly improves the static balance in both the population; active adult and geriatric population. On the contrary, the time*group*age has no interaction (p - .030). The magnitude of significance in the experimental group of active adults shows a small to large effect, whereas, the control group was stagnant at trivial effect. On the other hand, the experimental group of the geriatric population shows a medium to large effect, and a reduction in the effect size from small to trivial was recorded in the control group when compared at pre to mid, mid to post, and pre to post [Table 3-2.2].

2-Minutes Step Test

Significant interaction, group by time (p- .000, ηp^2 -. 597) was observed, hence the structured functional training has a significant effect on the aerobic capacity of active adult and geriatric population. Although, the time*group*age interaction was found insignificant (p - .410). The magnitude of significance for the active adult was recorded as medium to large whereas, the control group was at small and trivial. Similarly, the magnitude of the effect for the experimental group of the geriatric population was medium to large. whereas, the control group was at small and trivial when compared at pre-to-mid, mid-to-post, and pre-to-post [Table 3- 2.3].

Sit and Reach Test

A significant interaction of time by the group was observed (p - .000, ηp^2 - .802). Therefore, the structured functional training had a significant effect on the range of motion specifically to the lower back and hamstring, in both; active adult and geriatric populations. Although, no interaction (p - .082) among time*group*age was observed. The magnitude of the significance in the experimental group was increased from medium to large, and the control group was stagnant at trivial effect. On the other hand, the magnitude of significance in the experimental group of the geriatric population has increased from medium to large, where the control group was small and trivial when compared at three different points (pre, mid, and post) [Table 3- 2.4].

Back Scratch Test

The time by-group interaction in the active adult and geriatric population was significant (p - .000 ηp^2 - .395). Therefore, the structured functional training had a significant effect on the range of motion; upper body, and shoulder for active adult and geriatric population. Although the time*group*age interaction was insignificant. The magnitude of significance was large for the experimental group of active adult and geriatric populations, where the control group of each population had a trivial effect [Table 3-2.5].

Four Square Step Test

The significant interaction between time by group was observed (p - .000, $\eta p^{2)}$ for the experimental group of active adult and geriatric population. Hence the structured functional training improved the dynamic balance for both the groups. The time*group*age interaction was also significant (p - .002, $\eta p^{2\ -}$ .469). The magnitude of significance for the four-step test on the experimental group was larger on the geriatric population than the active adult. Whereas the control group of each population was stagnant at trivial effect [Table 3- 2.6].

Discussion

The purpose of the study was to test the efficacy of the structured functional training program on the motor fitness of the elderly population; active adult and geriatric population. The 12 week structured motor fitness training was given to the experimental group of both the population. The study observed a significant effect of provided treatment across both the population; active and geriatric, when compared to the control group. The study suggested that such training program is effective in retaining and improving the motor fitness of elderly population.

One of the key component of the study addresses is aerobic capacity and lower body strength. The following component was measured through chair stand and 2 minute step test. A notable change is observed in the experimental group of active adult and geriatric population following 12 weeks of structured functional training. These improvements were reported in both active adult and geriatric populations, emphasising the potential benefits of reducing the falling risk and therapies for different age groups within the elderly population. Similar findings were also reported in a study which concludes that practicing brisk walks, cycling, swimming, and multi joint exercise has significant improvement in muscular power and endurance (Galhardas et al., 2022; Jorgić et al.).

Additionally, the study address the challenges of coordination and balance that is crucial for aging elderly people. The following component in the experiment was measured through flamingo balance test and four square step test. The elderly people tends to have weak neurocircuitry channels. The repetition of yogic exercises and agility exercise played a significant role in improving the coordination and balance component in the experimental group of active adult and geriatric population (Adcock et al., 2020; Fahlman, 2007; Voelcker-Rehage & Niemann, 2013; Wolfson et al., 1996).

The flexibility in elderly population is reported by the scholars at several instances, losing the skeletal muscles mass, and strength during ageing process was the major mediating factor (Chiacchiero et al., 2010; Geremia et al., 2015; Wolf et al., 2018). In consideration to the above findings, the study explored the grouping of multi-component structured training, in combination to the resistance exercise and repetition of multi-joint exercise along with the flexibility exercise. It was observed that the experimental group of active adult and geriatric population notably improved their flexibility of lower back and hamstring that was measured through sit and reach test and flexibility of shoulder and upper body, measured through the back scratch test. The observed gains in flexibility highlights the comprehensive nature of structured motor fitness programs in addressing various aspects of physical function among elderly individuals (Diniz et al., 2020; Valipour Dehnou & Motamedi, 2018).

Furthermore, the positive outcomes observed in both active adults and geriatric population emphasizes the broad applicability and inclusivity of structured motor fitness interventions. Regardless of age or baseline fitness level, participants benefited from the program, underscoring its suitability for diverse segments of the elderly population. This inclusivity is particularly significant for promoting adherence and engagement in physical activity initiatives among older adults, fostering a sense of community and social support.

The multifaceted nature of structured motor fitness programs, incorporating elements such as strength training, balance exercises, and flexibility routines, aligns with current recommendations for promoting healthy aging and preserving functional independence. By targeting multiple domains of physical fitness simultaneously, these programs offer a holistic approach to promoting overall well-being among elderly individuals. Moreover, the observed improvements in physical function have broader implications beyond individual health outcomes. Enhanced physical performance among the elderly can translate into reduced healthcare costs, decreased reliance on medical interventions, and improved quality of life. By empowering older adults to maintain their independence and autonomy, structured motor fitness programs contribute to healthier aging trajectories and societal well-being. It is important to acknowledge some limitations of the study. While the intervention yielded significant improvements in physical function, long-term sustainability and adherence to the program remain important considerations. Future research could explore strategies to optimize program adherence and evaluate the durability of intervention effects over an extended period.

Conclusion

The study provides compelling evidence for the effectiveness of structured motor fitness programs in enhancing physical performance among elderly populations. By targeting key aspects of physical function, including strength, endurance, balance, flexibility, and mobility, these programs offer a comprehensive approach to promoting healthy aging and preserving functional independence, reducing risk of fall and other risk challenges. Although, continued efforts to be implement and evaluate on timely manner. Such interventions are essential for advancing in the field of geriatric fitness and optimizing health outcomes for elderly population.

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