Original Research Article

STUDY OF THE LEVEL OF PHYSICAL FITNESS AMONG HEALTHY GERIATRICS

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ABSTRACT

Background: Physical capacity is identified with morbidity and mortality of elderly. Appraisal of physical fitness helps to distinguish early physical ageing. Understanding the participation of physical fitness components to functional execution encourages the improvement of satisfactory exercise interventions aiming at protection of function and independence of elderly. The age-related disintegration of physiological limits, for instance, muscle strength and balance is connected with increased dependence. This study researched the physical fitness levels of older Indian adults and the ageing impact on fitness.

Purpose: To assess physical fitness in geriatrics using senior fitness battery tests, assessing the strength, endurance, flexibility and agility/dynamic balance in age group above 60 years.

Materials and Methods: Senior Fitness Test (SFT) was used which consisted of the 30second chair stand test, arm curl test, chair sit and reach test, back scratch test, 8 feet up and go test, 6-minute walk test and incremental shuttle walk test. The study was carried out on a sample of 146 participants (74 males and 72 females) aged from 60 years and above, both community dwelling as well as institutionalized elders in Mumbai city. On the basis of their age, the participants were divided into three sub-samples: Young old between the age group of 60-69 years, Middle old between age group 70-79 years and Old old between 80 years and above. Further subsamples of men and women were isolated. Further the data analysis was done.

Results: As per the normative data, best result was achieved by men in age group 60 – 69 as compared to women. For age group 60 – 69, the strength, flexibility, agility and endurance are more than age groups 70 – 79 and 80 & above.

Conclusions: The study of level of physical fitness in institutionalized and community dwelling among healthy geriatric population showed that the best result was achieved by men in the age group of 60-69 years than female. This suggests that as the age increases, the strength, flexibility, agility and endurance decreases.

KEY WORDS: Physical fitness, elderly, age groups, senior fitness test.

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INTRODUCTION

Functional fitness represents the physical capacity that is needed to undertake normal everyday activities, independently and without the early onset of fatigue. However, the aging process tends to reduce physical fitness (strength, endurance, agility, and flexibility), and results in difficulties in daily life activities of the elderly and in order to improve these we need to determine their extent [1].

Ageing is correlated to a disintegration of different physiological limits, for example, muscle strength, neuro-motor co-ordination, aerobic capacity and flexibility. With a specific end goal to protect physical functioning, and in this manner quality of life, it is of specific significance to comprehend the degree to which muscle strength, neuro-motor co-ordination,

aerobic capacity and flexibility add to functional performance [2].

Health is one of the essential elements, which empowers freedom in the execution of day by day or periodic physical activities. Their health state impacts the elderly to be all the more physically dynamic or more passive. Amid the ageing procedure, insufficient physical exercises prompt to changes in physical (functional) capacities, while their level is altogether identified with the decline in the functional capacities important for the day to day life. Physical performance can foresee changes in functional, mental, and social wellbeing, even in exceptionally old individuals. Consistent physical exercises and every day physical activities are important for normal working of the elderly, while optimal functioning of people is affirmed by higher and more levels of fitness indicators [3].

The physical fitness level of middle-aged men is a decent indicator of mortality Therefore; assessment of physical fitness may reveal a decrease in health and the onset of ageing. Numerous medical advantages are connected with musculoskeletal fitness, for example, increasing bone mineral density, reducing coronary risk factors, increasing flexibility, improving glucose tolerance, and more prominent achievement in attainment of activities of day to day living [3].

The cutting-edge lifestyle has prompted to an expansion in the number of inhabitants in the elderly. This event has prompted to the requirement for further research on the elements whose activity empowers the elderly to satisfy their regular needs without anyone else's input. A portion of the more critical elements incorporate physical capacities, which are communicated by the parameters of physical fitness and body mass [1]. The main aim of this study is to assess level of physical fitness of the elderly. For that, Senior Fitness Test (SFT) was used, consisting subtests- 30-second chair stand, Arm curl, Chair sit and reach, Back scratch,8-feet up and go,6-minute walk and Incremental shuttle walk test. Study was carried out on a sample of 146 participants (74 males,72 females) aged 60 years and above, both community dwelling and institutionalized elderly in Mumbai city and were divided into 3 sub-samples: Young old between the age group of 60-69 years, Middle old between 70-79 years and Old old for 80 years and above. Further the data analysis was done.

The calculation of the statistical significance of the difference between the subsample of men and women was determined. The results are shown in tabular form, while the discussion and conclusions point out the significant difference in the indicators between the subsamples determined based on the age. The basic aim of this research was to determine the statistical significance of the difference in the indicators of physical fitness of the elderly depending on their age.

MATERIAL AND METHODS

Materials used for the present are geriatric fitness Battery Test, measuring tape for height, weighing scale for weight, 44 cm height chair for chair stand test, sit and reach test, 8feet up and go test, Cones for 8feet up and go test, 6min walk test, shuttle test, Stop watch for 8feet up and go test, 6 minute walk test, arm curl test, chair stand test and metronome for shuttle test.

Inclusion Criteria: This includes all males and females aged 60 or above, individuals willing to participate in the study, older people living in a institutionalized or residential care facility, able to walk six meters or more (with or without a walking aid), able to comprehend the study procedures and no medical contraindication for study participation.

Exclusion Criteria: This criteria involves active illness such as fever, cold, coughs, etc. any acute exacerbation of respiratory conditions, any cardiac illness, congenital or acquired neuromuscular disease, cognitive issues, psychiatric problems, metabolic, hepatic, renal dysfunctions and Recent Surgeries.

Methodology: The subjects who fulfilled the inclusion criteria and willing to participate were explained about the procedure in the language best understood by them and a written consent was taken from them. Before approaching the population, permission was taken from the respective authorities. The tests were performed at community level and not in a laboratory set up.

General instructions were given prior to the test: comfortable clothing should be worn, meal

should be taken 2 hours prior to the test and should not intake alcohol 24 hours prior to testing. The demographic details of the subjects like name, age, gender, height, weight, present and past medical history was noted. The subject then underwent the senior fitness test.

The test battery was divided into 5 stations: Station 1: Here, the basic information was given and a consent form was taken, after which the BMI was calculated. Station 2: Here, the 30 second chair stand test, Arm curl test, and the Chair sit and reach test were performed. Station 3: Here, the Back scratch, and the 8 foot up and go tests were performed. Station 4: Here, the 6-minute walk test was performed. Station 5: After a break of 4 hours (after the 6minute walk test), the Shuttle walk test was performed.

After all the tests were performed, the Data Analysis was done.

Procedure

A senior fitness battery test consists of the following: A 30 second chair stand test, arm curls, 6-minute walk, chair sit and reach, back scratch, 8 feet up and go, shuttle test.

Anthropometric data: This involves height, weight, body mass index

1. 30-Second chair stand test

To assess lower body strength and endurance: It involves standing up from the chair and sitting down on the chair of a 44-cm height. The trial was initiated by sitting on the chair, the feet resting on the floor, the hands crossed at wrists and held on the chest. At a command given by the examiner, the participant performed greatest number of standing-up cycles within 30 seconds. Number of performed cycles constitutes the test result.

2. Arm curl

To assess upper body strength and endurance: The participant was sitting on the edge of a stable chair, with seat height of 44 cm. The back was outstretched, the feet resting flat on the ground. A handle weighing 2 kg for women or 3 kg for men was held in the dominant hand. Participants were asked to rotate the hand upwards while simultaneously flexing the extremity in the elbow (flexion with supination), and subsequently to extend the extremity to its baseline position. The testing person was sitting or kneeling aside on the dominant side of the examined person holding his fingers at a half-length of the participant's biceps in order to stabilize the arm and prevent arm flexion. Total number of correctly performed forearm flexion within 30 seconds constitutes the result of the test.

3. Back scratch

To assess upper body flexibility: Participants were made to sit on a chair and were asked to take 1 hand over the shoulder and other hand up the middle of back. The distance between the tips of middle finger of both the hands was measured in inches (cms). The distance, for participants who were able to overlap both the fingers, was noted as negative (-) and for the ones who were not able to touch the tips was noted as positive (+).

4. 8-feet up and go

To assess agility/dynamic balance: Participants were made to sit on a chair. A distance of 8 feet (2.44 m) was measured from the chair and was marked by a cone on the other end. Participants were asked to get up from the chair, walk for the measured distance, turn around the cone n walk towards the chair and sit again. The time was noted, in seconds, taken by the participant to complete the task.

5. Chair sit and reach

To assess lower body flexibility: Participants were asked to sit on a chair with leg extended and hands reaching towards the toes. The distance between tips of the middle finger of the extended hand to that of the great toe was measured in inches (cms). Distance was noted as positive (+) when the participants were able to cross the level of great toe and was noted negative (-) for the participants who lagged behind the great toe.

6. 6-minute walk test

To assess aerobic endurance: It involves determination of a possibly long distance covered by the patient possibly fast within 6 minutes. The walking track was demarcated by poles and was also drawn on the ground. Parameters such as pulse rate, respiratory rate, blood pressure, Borg's scale were taken before and after the test. The walk was paused for a moment and resumed when the participant has to have a rest. The test terminated in case the examined person reports dizziness, nausea, excessive fatigue, pain, or if the examiner noticed other alarming symptoms. The person conducting the trial informs the participant about the passing time after the third and the fourth minute, and every 10 seconds during the last minute, while simultaneously encouraging the examined person to continue the walk.

7. Shuttle test

To assess aerobic endurance: Participants were made to sit and their basal parameters were taken. A distance of 10 meter was measured and marked by cones on both the ends. The participants were explained about the metronome which was played on a CD. Instructions were given to start walking with the beep and reach the other end before the other beep. Initially the speed of walking was slow and progressively it increased. It was informed to the participants that the speed was to be increased with the change in sound of the beep. The participants were asked to walk as long as they feel breathless or could no longer keep up with the beeps at which time the beep ends. The no. of laps was counted and the additional distance was measured. The basal parameters were again taken and noted post-test i.e. after 1 min, 3 min and 6 min.

RESULTS

Demographic Data: The total sample size was 146, out of which there were 74 males and 72 females.

Table 1: Sample distribution.

SEX	60-69YEARS	70-79YEARS	80 YEARS AND ABOVE
MALE	n=32	n=35	n=7
FEMALE	n=43	n=22	n=7

Table 2: Sample distribution based on BMI.

MALE				FEMALE		
60-69 YEARS	70-79 YEARS	80YEARS AND ABOVE	GRADES OF BMI	60-69 YEARS	70-79 YEARS	80YEARS AND ABOVE
n=32	n=35	n=7	TOTAL PARTICIPANTS	n=43	n=22	n=7
1	0	0	UNDERWEIGHT	2	1	0
18	11	2	NORMAL	17	8	4
7	12	4	OVERWEIGHT	14	8	3
6	12	1	OBESE	10	5	0

Statistical analysis: The collected data was analyzed using Microsoft Excel & Spreadsheet using parameters: mean & standard deviation.

As presented in the table 1, the mean values of 30 second chair stand for male participants in age group 60-69, 70-79, 80 and above are 11.68, 9.74, 8.15 and for females is 11.18, 9.72, 7.57 respectively and the standard deviations were calculated. In the graph 1, presenting age groups on x-axis and mean values on y-axis; wherein it is seen how the lower limb strength decreases according to age with differences in male and female age groups. However, it is seen that there is not much difference between them in middle old age groups.

**Graph 1:** Showing the Mean of 30 Second Chair stand Test.
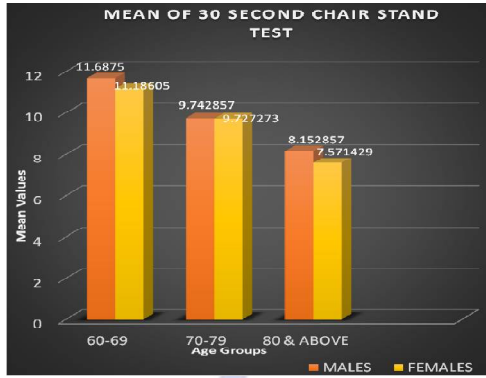
Table 3: Showing the Mean and SD for different age groups in Males and females.

Male		Age Groups	Female	
Mean	SD		Mean	SD
11.687	4.575	60-69 years	11.18	2.383033
9.7428	3.257	70-79 years	9.72729	2.394076
8.1528	1.951	80years & above	7.57142	1.397

In table 4, the mean values for arm curl, in males in age groups young old, middle old and old old is 17.81,16.88 and 7.85 and in females is 14.86, 13.54 and 4.85 respectively. We see in graph 2, presenting mean values on y-axis, where the arm curl readings decrease gradually from the young old age group to Old old and is notably less in age group 80 and above. Besides, a significant difference in upper limb strength can be seen between males and females.

Graph 2: Mean of Arm Curl Test.
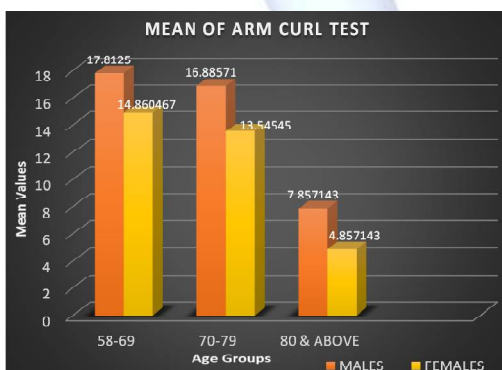
Table 4: Showing the means and SD of Arm Curl Test.

Male		Age Group	Female	
Mean	SD		Mean	SD
17.8125	6.023	60-69 years	14.86046	4.68829
16.8857	7.466	70-79 years	13.54545	3.31988
7.85714	5.304	80 years & above	4.857143	2.67261

For back scratch test, in table 3, the mean values of age group 60-69, 70-79, 80 and above are 0.75,0.71, 2.84(denoting that as the reading increases, the flexibility decreases) and for females is 0.33, 0.77, 1.67. In the graph 3, which shows mean values of back scratch test on y-axis, we can see there is not considerable difference in reading, that is, the flexibility in the age groups young old and middle old; however, there is notable decline in the flexibility of the Old old participants.

**Graph 3:** Mean of back scratch test.
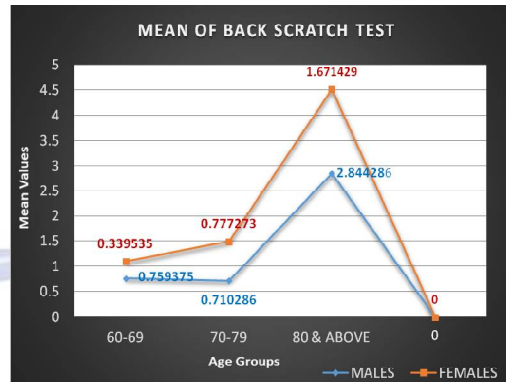
Table 5: Mean and SD of back scratch test.

Male		Age Group	Female	
Mean	SD		Mean	SD
0.75937	4.0988	60-69 years	0.3395	2.8415092
0.71028	4.773	70-79 years	0.7772	2.889049
2.84428	5.9009	80 years & above	1.6714	5.189642

For Chair sit and reach test, the mean values for males in age groups young old, middle old and Old old as seen in table 4 is, 3.73, 3.97, -0.77 and for female participants is 4.16, 2.60, and -1.61 respectively. The negative reading in chair sit and reach test denotes the reduction in flexibility. The graph 4 demonstrates the mean values of the flexibility of the participants on y-axis and their age groups on x-axis; where we see not much difference in flexibility of males and females in age groups 60-69 yrs and 70-79 years. However, there is significant reduction in the result of 80 years and above age group, where the flexibility reduces considerably.

**Graph 4:** Mean of chair sit and Reach Test.
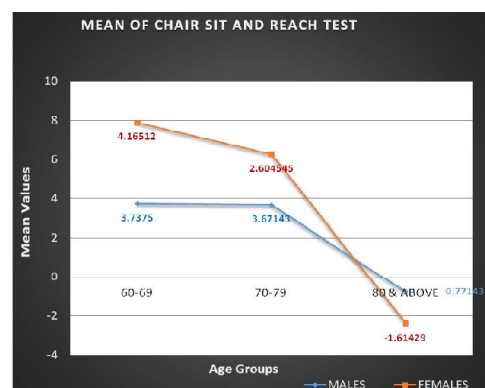
Table 6: Mean and SD of chair sit and Reach Test.

Male		Age Group	Female	
Mean	SD		Mean	SD
3.7375	3.0852	60-69 years	4.1651	3.514
3.67143	4.5232	70-79 years	2.6045	5.937
-0.77143	2.3386	80 years & above	-1.6142	4.831

The mean values of 8 feet up and go test, as seen in table 5, for age group 60-69, 70-79, 80 and above are 11.53, 11.28 and 10 and for female participants is 9.96, 8.9, and 7.85 respectively. Next, the standard deviation is calculated. In the graph 5, the mean values are presented on y-axis and age groups on x-axis and it is seen that the agility decreases gradually among age groups young old, middle old and Old old with a considerable difference in readings, that is agility, between males and females in each age group.
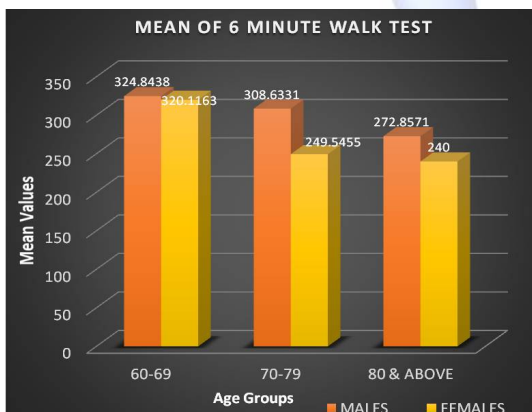
Graph 5: Mean of 8 feet up and Go Test.
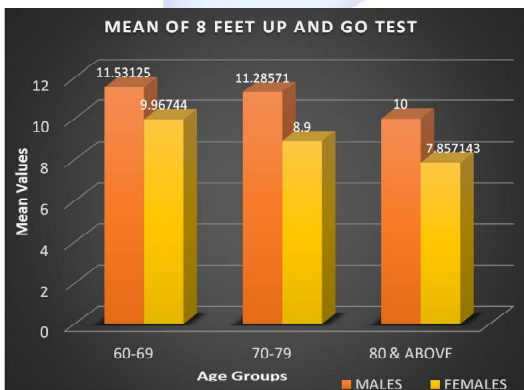
Table 7: Mean and SD of 8 feet up and Go Test.

Male		Age Group	Female	
Mean	SD		Mean	SD
11.5312	3.25263	60-69 years	9.96744	2.61823
11.2857	3.58568	70-79 years	8.9	2.32177
10	3.03315	80 years & above	7.85714	1.573592

Graph 6: Mean of 6 Minute walk test.

For 6 min walk test, mean values are shown in table 7, which in male participants for age young

old, middle old and Old old are 324, 308 and 272 and for females are 320, 249 and 240 respectively. Further standard deviations are noted. In graph 6, we see gradual decrease in readings from age groups 60-69 to 80 and above among males and specifically among females.

Table 8: Mean and SD of 6 Minute walk test.

Male		Age Group	Female	
Mean	SD		Mean	SD
324.843	185.8784	60-69 years	320.116	134.6975
308.633	121.8015	70-79 years	249.545	73.83877
272.857	101.1128	80 years & above	240	57.4456

Table 9 shows mean values for Shuttle test, for male participants from age groups 60-69, 70-79, 80 and above are 137.81,89.71 and 71.42 and for females are 126.74, 96.18 and 88.57 respectively. The mean values are demonstrated on y-axis of the graph. It can be seen that there is considerable decline in the readings of shuttle walk test from age groups Young old to Old old.

Graph 7: Mean of shuttle Test.
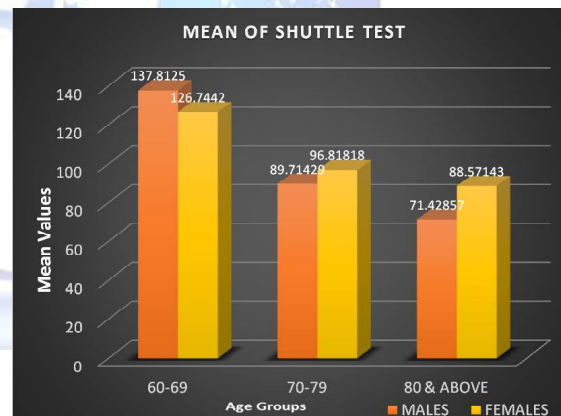
Table 9: Mean and SD of shuttle Test.

Male		Age Group	Female	
Mean	SD		Mean	SD
137.8125	117.6855	60-69 years	126.7442	134.6975
89.71429	121.8015	70-79 years	96.81818	73.8387
71.42857	101.1128	80 years & above	88.57143	57.4456

DISCUSSION

A comprehension of the components that impact physical movement behaviour in older adults is imperative to creating compelling intervention techniques that will address the issue of physical latency in this populace, and in doing as such, enhance the wellbeing status and quality of life of the older adults, while significantly affecting medicinal services expenditures [4].

Ageing is connected with cardiorespiratory wellness and muscle strength [6]. Promoting a healthy lifestyle in the elderly has become more important due to the dramatic increase in their population over the last two decades. And, to monitor and evaluate health, the level of physical activity is often used. The monitoring is especially important for the elderly to prevent diseases, immobilization & reduction of mortality rate. The parameters of aerobic endurance were found to be progressively decreasing. In the age group of 60-69 males demonstrated better results in the 6-minute walk test with a considerable difference between male and female in the age group of 70-79 thereafter following a progressive deterioration. On articles based on western countries show similar results where women with higher BMI have a poor physical performance in the 6-minute walk test [5].

The 30-sec chair stand test demonstrates greater strength amongst male in the age group of 60-69with the strength found to be equal in the age group of 70-79. It was observed that strength decreases as age increases [1,5]. Similar significant results were found for arm curl test. The back-scratch test assessing upper extremity flexibility shows a maximum decline in males in the age group of 80-89. Maximum flexibility seen in men in the age group of 60-69 with no significant changes in the age group of 70-79 i.e. women are more flexible than men. Males in the age group of 80 and above demonstrate the least flexibility with maximum flexibility seen in females in the age group of 60-69 whereas males are more flexible as compared to females in the age group of 70-79. The agility/dynamic balance assessing 8 feet up and go test demonstrated best results for males in the age group of 60-69 followed by a progressive decrease in performance as age increases. The endurance measuring shuttle walk test demonstrated better results for females in the age group above 70 whereas males demonstrated better results in the age group of 60-69 years. It thus can be concluded that there occurs age related decrease in physical activity & functional fitness among men & women with differences present among young old, middle old & old old.

These differences occur due to a reduction in muscle strength in both upper & lower limb & changes in body fat percentage, flexibility, agility & endurance. Individuals with higher BMI, a greater amount of fat mass have a poor physical performance suggesting that an excessive percentage of body fat has a negative effect on functional performance.

CONCLUSION

A sample of 146 participants aged more than 60, of both genders, was used to study the differences in the achieved results on a battery of SFT tests. The differences were determined for the subsamples which were obtained based on age and membership. The determined statistically significant differences confirm the basic assumption that the indicators of physical fitness of elderly men and women differ in a statistically significant manner depending on the group they belong to.

For all the age groups, the mean values of 30second chair stand for males is 10.432 and for females is 10.388 and for arm curl, in males is 16.43 and in females is 13.26. For Chair sit and reach test, the mean values for males is -0.240 and for females is 2.411; and in males is 0.9333 and in females is 0.60 for back scratch. The mean values of 8 feet up and go for females is 9.436 and for males is 11.24. For 6 min walk test, mean value in males is 312.25 and in females is 291.18 and for shuttle test, mean values for male is 108.78 and for females is 105.27. The study of level of physical fitness in institutionalized and community dwelling among healthy geriatric population showed that the best result was achieved by men in the age group of 60-69 years than female. Critical reductions in physical wellness begin at the age of 55-60 years and decay rapidly, recommending a hazard to quality of life. Physical fitness evaluation ought to be performed routinely for early intercession. A comprehension of the components that impact physical activity behaviour in older adults is critical to creating compelling intervention strategies that will address the issue of physical inactivity in this populace, and in doing as such, enhance the health status and quality of life of the older adult, while significantly affecting healthcare expenditures.

Conflicts of interest: None

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