



EVALUATION OF PHYSICAL AND CARDIORESPIRATORY FITNESS IN COMMUNITY DWELLING ELDERLY RURAL POPULATION

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Abstract: The major challenge in preventive geriatric care is that physical activity decreases with age and inactive older people are at high risk of diseases. This was a study conducted on 60 community dwelling elderly rural population. . Sampling technique was simple random technique and study material was Cone markers, Chair without arm rest, Measuring tape. The entire procedures involved in the study was explained to each subject. After explaining the purpose of the study a written informed consent was obtained from the participants and then the foot up and go test, chair sit and reach test and 2 -min walk test was taken for balance, flexibility and endurance respectively over the elderly rural population. The result shows that the mean values of balance, flexibility and endurance in elderly rural population. And also the value of balance, flexibility and endurance in men and women and their mean value according to different age groups. The study concluded that the endurance is more in elderly population than balance and flexibility. And as compared between the gender, the balance is more in men and women has greater flexibility and endurance as compared to men.

Index term: Physical fitness, Cardiorespiratory fitness, Community dwelling elderly rural population, Senior Fitness Test, Balance, Endurance, Flexibility.

1. INTRODUCTION:

Level of physical fitness or 'functional fitness', defined as "having the physiologic capacity to perform normal everyday activities safely and independently without undue fatigue" can be determined by various test protocols^[1]. Over the years, the focus of public healthcare services for the aging population has been to increase physical activity levels in order to maintain functional independence^[2]. After reaching 30, aging leads to a progressive loss of muscular strength, muscular endurance, joint flexibility, and balance^[3-5]. Age-induced musculoskeletal fitness loss may inhibit older people from performing basic functional tasks such as lifting and moving objects, rising from a chair, and walking. Musculoskeletal Fitness (MSF) is therefore an important determinant of one's capability to manage daily life activities and maintain functional independence^[6-8]. Muscular function is not the only deterioration associated with the aging process if PA is not maintained. The cardiorespiratory system is also susceptible to change, and significant decreases in aerobic capacity have been found after the age of 40 years, such that at the age of 65 years it has approximately 30% less capacity^[9]. The proportion of elderly population in India has been documented to be 7% in 2009 which is projected to rise to 20% by 2050. This translates to approximately 88 million in 2009 with a projected rise to 315 million by 2050^[10]. Effective approaches to help older people maintain a healthy and active life are urgently needed, as the elderly have twice as many disabilities and four times as many physical limitations as people less than 60 years of age^[11]. The capacity for elderly people to undertake aerobic activities such as walking and running is adversely affected by advancing age, due to the decline in maximal oxygen uptake of about 0.5%–1.0% per year^[12]. Cardiorespiratory fitness is closely related to aerobic exercise performance, which refers to the ability to maintain a certain velocity or power output produced by the body's large muscles for a prolonged time. In the developed countries insufficient PA has been identified as the fourth leading risk factor for mortality after tobacco use, overweight or obesity, and elevated blood pressure. The major challenge in preventive geriatric care is that physical activity decreases with age and inactive older people are at high risk of diseases^[13]. Cardiorespiratory fitness decreases with aging and population-based reference values for different age groups are needed to help professionals to better evaluate an individual's fitness level and

responsiveness to regular exercise training for primary and secondary prevention purposes. Tests have been designed specifically for the elderly and adjusted to older people, among them the Senior Fitness Test. The Senior Fitness Test is a functional test of muscular strength, endurance, balance and flexibility. Each test component of the SFT has been selected for its high reliability in a fitness facility or large community facility^[14]. The Senior Fitness Test (SFT) developed by Rikli RE and Jones CJ is one of the simplest and best tools in assessing six important 'functional fitness' parameters for the elderly, comprising of body composition, lower and upper body strength, aerobic endurance, lower and upper body flexibility, and agility/ dynamic balance. Although such studies have been done in other parts of the world, there is limited published data from India. Therefore, this Community based study was undertaken in a rural population to determine the normative scores of SFT in the geriatric population.

2. MATERIAL AND METHODOLOGY:

2.1 Study Design - Observational study

2.2 Study Set Up- In Vikhe Patil Memorial Hospital, Ahmednagar city

2.3 Sample Size – 60

2.4 Sample Techniques - Simple Random technique

2.5 Study Material- Cone markers, Chair without arm rest, Measuring tape

2.6 Inclusion Criteria: Age-above 60year, Elderly rural population, Both gender

2.7 Exclusion Criteria: Lower limb amputated individual, Un co-operative patients, Patient with recent surgery.

2.8 Procedure

The ethical clearance from ethical committee of college of physiotherapy was obtained. Subjects fulfilling the inclusion and exclusion criteria were included in the study. The entire procedures involved in the study was explained to each subject. After explaining the purpose of the study a written informed consent was obtained from the participants and the selective assessment tool of Senior Fitness Test will be taken

Demographic data of the participants were collected. And the participants will have to perform the following test.

1. FOOT UP-AND-GO TEST – It is used to measure the balance while moving.

Place the chair next to a wall (for safety) and the marker 8 feet in front of the chair. Clear the path between the chair and the marker. The subject starts fully seated, hands resting on the knees and feet flat on the ground. On the command, "Go," timing is started and the subject stands and walks (no running) as quickly as possible (and safely) to and around the cone, returning to the chair to sit down. Timing stops as they sit down. Perform two trials. Take the best time out of the 2 trails.

2. 2-MINUTE STEP TEST – It is used to measure the aerobic endurance.

The subject stands up straight next to the wall while a mark is placed on the wall at the level corresponding to midway between the patella (kneecap) and iliac crest (top of the hip bone). The subject then marches in place for two minutes, lifting the knees to the height of the mark on the wall. Resting is allowed and holding onto the wall or a stable chair is allowed. Stop after two minutes of stepping. Record the total no. of times the right knee reaches the tape level in 2 minutes.

3. CHAIR SIT-AND-REACH TEST- It is used to measure the flexibility.

The subject sits on the edge a chair (placed against a wall for safety). One foot must remain flat on the floor. The other leg is extended forward with the knee straight, heel on the floor, and ankle bent at 90°. Place one hand on top of the other with tips of the middle fingers even. Instruct the subject to Inhale, and then as they exhale, reach forward toward the toes by bending at the hip. Keep the back straight and head up. Keep the knee straight, and hold the reach for 2 seconds. The distance is measured between the tip of the fingertips and the toes. If the fingertips touch the toes then the score is zero. If they do not touch, measure the distance between the fingers and the toes (a negative score), if they overlap, measure by how much (a positive score). Perform two trials. The score is recorded to the nearest 1/2 inch or 1 cm as the distance reached, either a negative or positive score.

Final conclusion will be made depending upon the score of all the participant.

2.9 Outcome Measures: Foot Up-and-Go, 2-Minute Step Test, Chair Sit-and-Reach

3. RESULT:

The present study was conducted on 60 healthy rural elderly population who were found in Ahmednagar city.

The mean value for balance in the elderly rural population was (14.44±5.85 in sec)

The mean value for flexibility in the elderly rural population was (-4.27±2.40 in inches)

The mean value for endurance in the elderly rural population was (59.96±12.59 steps).

Table 1-depicts the mean value of balance, endurance and flexibility

Test	Mean value
Balance (foot up and go test)	14.44±5.85 in sec
Flexibility (chair sit and reach test)	-4.27±2.40 in inches
Endurance (2-min step test)	59.96±12.59 steps

Table 2-depicts of balance, flexibility in bot

the mean value endurance and male and female

GENDER	BALANCE (FOOT UP AND GO TEST)	FLEXIBILITY (CHAIR SIT AND REACH TEST)	ENDURANCE (2-MIN STEP TEST)
MALE	13.37	-4.74	65.18
FEMALE	15.73	-3.69	58.26

From this study it is shown that the flexibility and endurance is more in women than men but the balance is more in men than women.

The mean value for balance, flexibility, endurance of community dwelling elderly rural population as per different age group is given in the table below.

The mean value was also calculated according to different age group for balance, flexibility, and endurance which was also less compare to normal value.

Table 3-depicts the mean value of balance, endurance and flexibility with the different age group

Age	Mean age	Balance (foot-up-go test) in sec	Flexibility (chair sit and reach test) in inches	Endurance (2-min step test) steps
60-64	61.33±1.34	12.77±6.50	-4.53±1.98	60.4±15.25
65-69	66.9±1.66	12.98±5.58	-3.74±3.53	63.7±11.67
70-74	71.56±1.26	15.92±5.58	-3.35±2.64	63.56±13.62
75-79	76.33±1.11	12.87±3.03	-5.12±1.12	58.55±5.00
80-84	81.83±1.16	19.22±5.82	-5.37±1.83	53.33±10.74
85-89	85.33±0.57	10.07±8.96	-4.06±1.85	50.33±1.52
90-94	92	10.9	-6.5	40

The study shows that the mean value for balance, flexibility and endurance in elderly population of Ahmednagar is less as compare to the normal value. This study was togetherly carried out for the first time to know the physical fitness of the community dwelling elderly rural population in the Ahmednagar city.

Figure1-indicating the mean value of balance, flexibility and endurance.

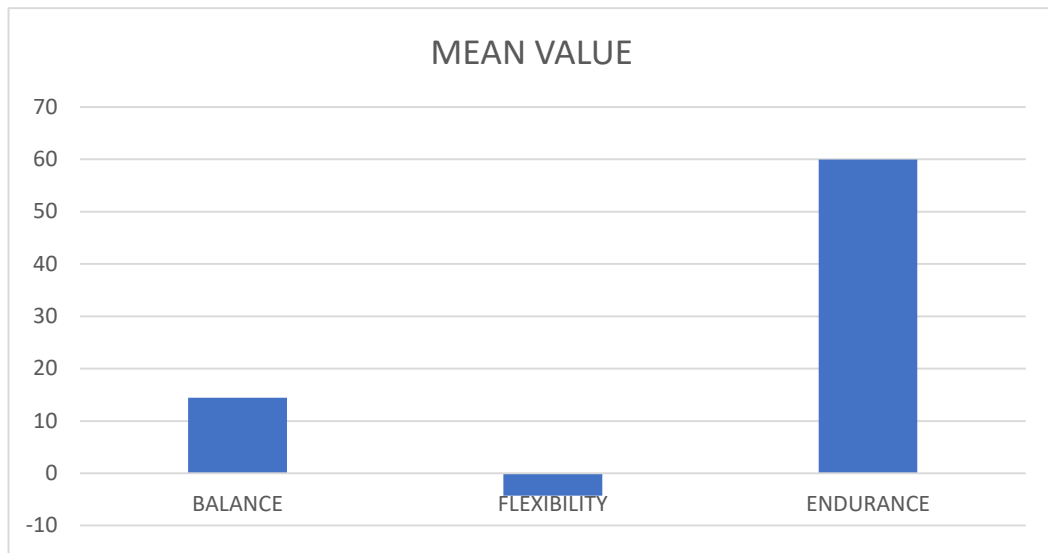


Figure 2- indicating the mean value of balance related to different age group in elderly

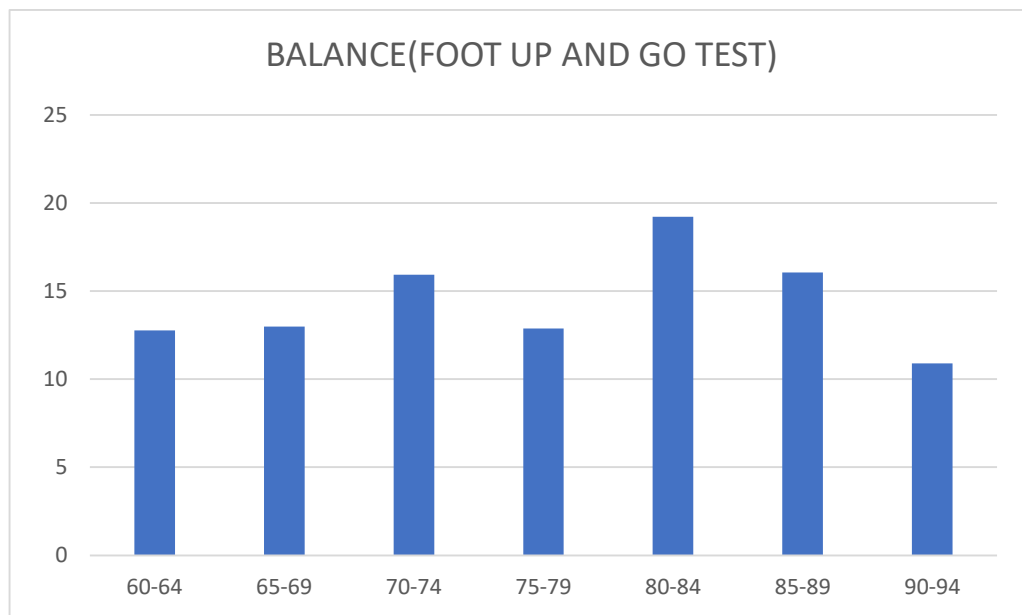


Figure 3-indicating the mean value of flexibility related to different age group in elderly

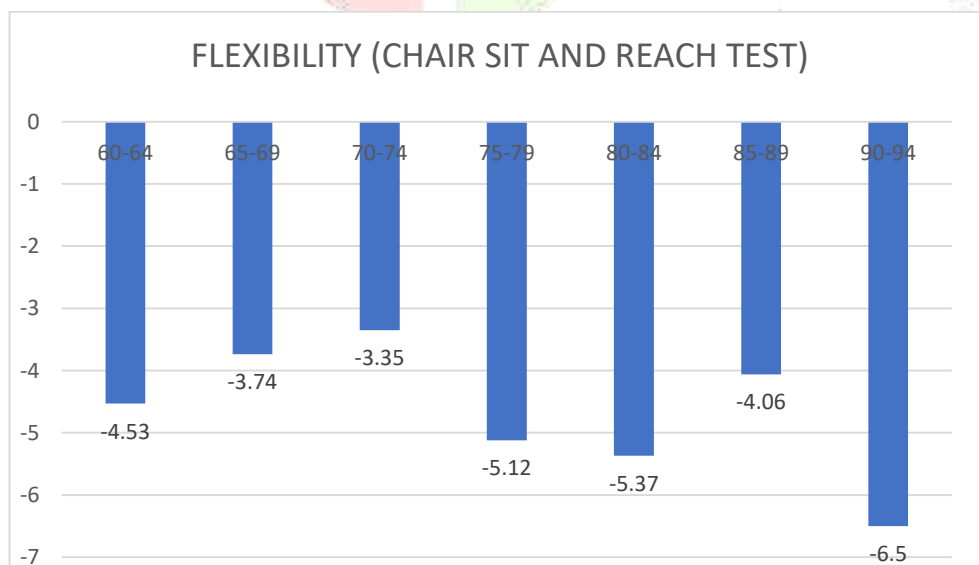


Figure 4-indicating the mean value of endurance related to different age group in elderly

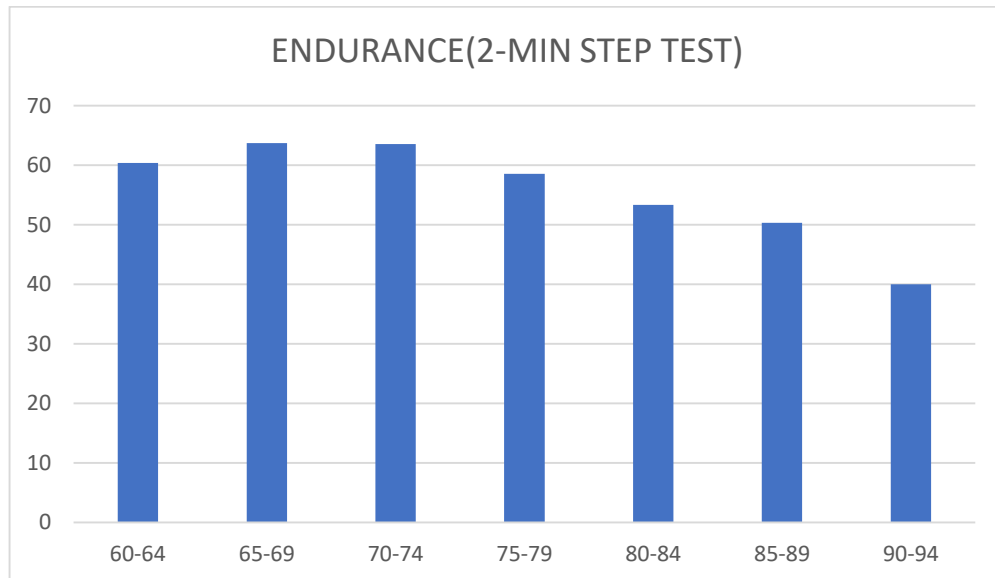


Figure 5-indicating the mean values of age and different test of physical fitness

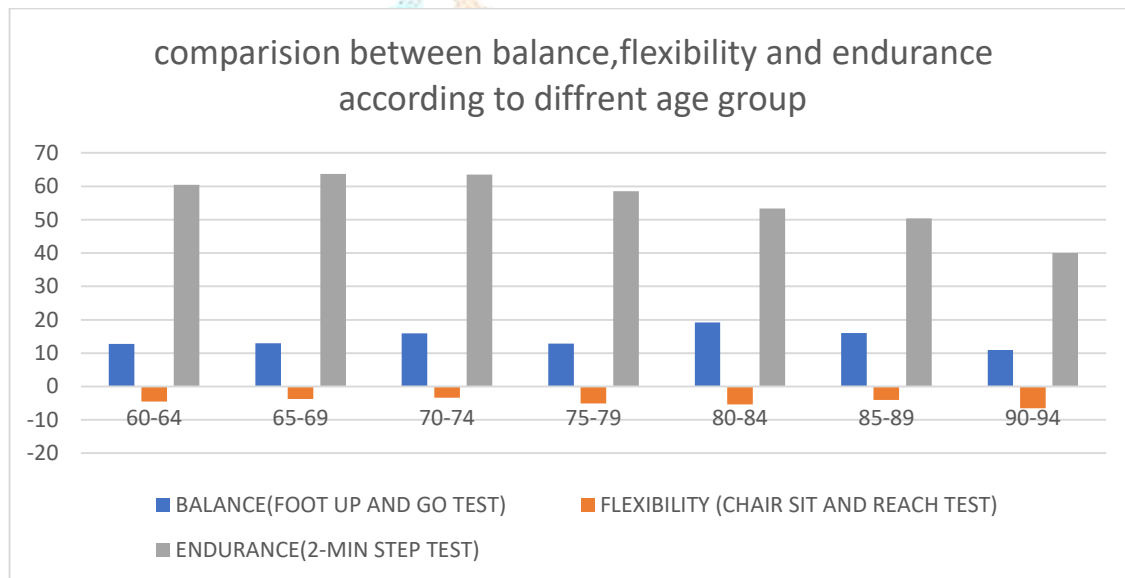
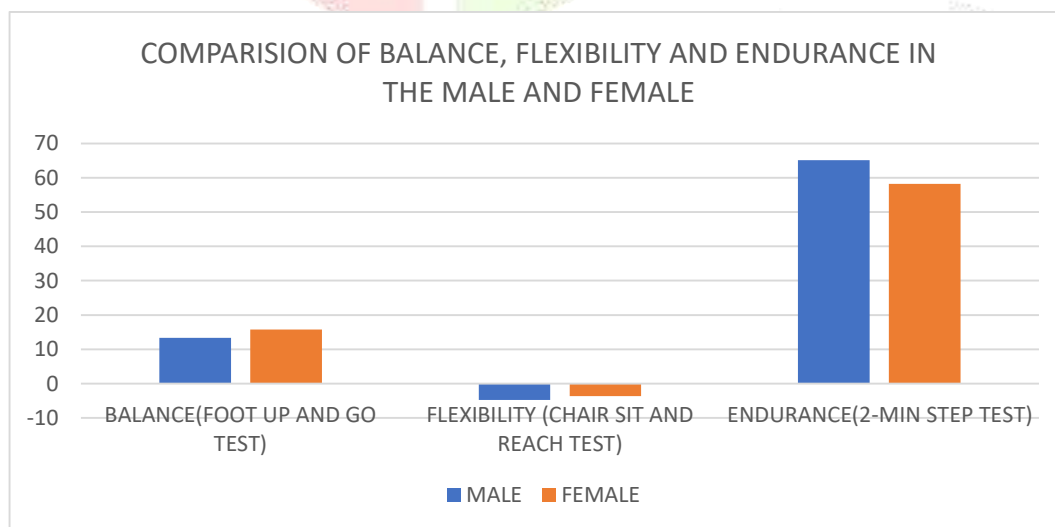


Figure 6-indicating the comparison of balance, flexibility and endurance between male and female



4. DISCUSSION:

The present study shows that the physical and cardiorespiratory fitness among community dwelling elderly rural population. The optimal level of physical fitness play an important role at any age of life. The decreased in physical fitness with age inevitable as the age increases the physical fitness/physical capacity of an individual decreases.

The balance was tested by using foot up and go test and measured in seconds as shown in graph 1. Mean value for balance in the mean age group of (71±7.90) is 14.44± 5.85 sec. As there is decline of sensory system in elderly adults which reduces an ability of older adult to adapt the changes in the environment and maintain balance. The graph 2 shows that the mean value of balance according to the different age groups which shows that there is decreased in the value of balance as compared to different age groups normal value. Graph 6 shows the comparison between male and female about the balance and the balance is more less in women as compared to men i.e. the mean value of balance in men is 13.37 in sec as compared to women is 15.73 in sec as indicating age related changes occur faster among elderly women. Physiological decline, particularly a reduction in Bone Mineral Density (BMD), muscle mass, strength can possibly be attributed to oestrogen deficiency as a result of menopause. And the main cause is the postmenopausal osteoporosis, to be one of the causative factors in balance problems.

The flexibility was tested by the chair sit and reach test and measured in inches as shown in graph 1. Mean value for flexibility in the mean age group of (71±7.90) is -4.27±2.40 in inches. While interpreting the values of flexibility tests, lower the values obtained better the flexibility. Metabolic alterations in the muscles and mitochondrial DNA deletion can contribute to the decline in overall fitness capacity of the elderly. The graph 3 shows that the mean value of flexibility according to the different age groups which shows that there is decreased in the value of flexibility as compared to different age groups normal value. Graph 6 shows the comparison between male and female about the flexibility and the flexibility is more less in men as compared to women i.e. the mean value of flexibility in women is -3.69 in inches as compared to men is -4.74 in inches. women are 20-40% more flexible than men as described in previous study.

The endurance was tested using 2-min step test and measured in steps as shown in graph 1. Mean value for endurance in the mean age group of (71±7.90) is 59.96±12.59 step. This is occur as the result of decrease in the respiratory ability of lungs, muscle atrophy, the decreased ability of the muscle contraction of heart and the decrease in oxygen consumption which leads to fatigue and reduces the endurance with increase in the age. The graph 4 shows that the mean value of endurance according to the different age groups which shows that there is decreased in the value of endurance as compared to different age groups normal value. Graph 6 shows the comparison between male and female about the endurance and the endurance is less in women as compared to men i.e. the mean value of endurance in men is 65.18 in steps as compared to women is 58.26 in steps.

Overall we can say that there is decline in balance, flexibility and endurance in elderly population as compare to the normal value. Even the physical fitness is tested in healthy elderly rural population the values are less as compared to normal value due to aging and less physical activity. From this study which shows that decrease in flexibility, balance, and endurance will lead to decrease in ability to perform the activity, increases the risk of fall, and decreases the overall fitness; So it is convey that the elderly rural population should undergo physical fitness program to be independent in their daily activities and which also improves the Quality of Life.

5. CONCLUSION:

Physical and cardiovascular fitness play an important role to carry out any activity in daily life. Overall the physical and cardiovascular fitness is less in elderly rural population as compared to their normal values. Among the balance, flexibility, and endurance test; the endurance is more in elderly population than balance and flexibility. And as compared between the men and women; men has the greater values for balance than women.and women has greater value for flexibility and endurance than men.

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