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Research Article

EFFECT OF AGE ON TEST PERFORMANCE IN COMMUNITY DWELLING ELDERLY PEOPLE: 6 MINUTES WALK TEST AND TEN STEPS TEST

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ABSTRACT

The data available in literature for test performance in elderly people are less and insufficient for use as a basis of comparison. The aim of the study was to investigate age related changes in functional performance tests and to determine criterion values depending on age in older adults who are functioning independently in the community. **Aim**: To study the effect of age on test performance in 6 Minute Walk Test and Ten Step test in community dwelling elderly people. **Objectives**: To assess 6 minute walk distance, time taken to perform ten step test and to report data within age cohorts. **Method**: Total 90 subjects were included and divided into 3 groups according to age group, A-(61-65), B-(66-70), and C-(71-75) in each 30 subjects. 6 Minute Walk Test and Ten Step Test were performed on them. The data obtained was analyzed using one way ANOVA and post hoc test. **Result**: The mean 6 MWD in group A was 317.13 ± 35.44 mts, in group B was 297.10 ± 47.14 mts and in group C was 262.83 ± 42.14 mts. The 10 Step Test time was found to be 11.36 ± 2.06 sec in group A, 13.24 ± 3.49 sec in group B and 14.74 ± 3.16 sec in group C. The results showed that there is a progressive decrease in the 6 MWD and progressive increase in the time taken to complete TST with increasing age. **Conclusion**: From the results it can be concluded that there is a progressive decrease in the test performance (6MWT & 10 Step test) with age in community dwelling elderly people. The results of this study can be used as reference values while performing performance tests for elderly people in the community.

Keywords: 6 minute walk test, 10 step test, Community dwelling

INTRODUCTION

In recent years there has been an increasing international awareness of health issues relating to aging populations.[1] There has been a sharp increase in the number of older persons worldwide.[2,3] According to the Demographic Profile of Elderly, India carries 15% of world population. The fastest growing age group by percentage is between 65 – 75 years of age. With a decline in fertility and mortality rates, compared with an improvement in child survival and increased life expectancy, there is a progressive rise in the number of elderly persons (accepting 60 years of age as a practical demarcation for defining elderly). Aging results in significant decline in muscle power and exercise capacity. Therefore, elderly often function at the limit of their capacity in order to fulfill activities of daily living. Determination of remaining physical capacity is important in clinical decision making.[4] Many independent older adults often due to their sedentary lifestyles, function dangerously close to their maximum ability level during normal activities. Climbing stairs or getting out of a chair requires the use of near maximum efforts for many older individuals. Early identification of physical decline and appropriate interventions can help to prevent

functional impairments such as in walking and stair climbing that often results in fall and physical frailty.[5] Quality of life in old age depends to a large extent on 'being able to continue to do what you want without pain as long as possible. Being able to perform everyday activities like personal care, household work requires the ability to perform functional movements such as walking, stair climbing, and standing. These functional movements in turn are dependent on having sufficient physiological reserve i.e. strength, balance, endurance, flexibility. Functional fitness performance is 'having the physiological capacity to perform normal everyday activities safely and independently without undue fatigue. [5] Many senior fitness instructors have been frustrated with lack of tests available to assess the functional fitness of older adults particularly tests that have accompanying performance standards.

The ability to walk for a distance is a quick and inexpensive measure of physical function and important component of quality of life. It reflects the capacity to undertake day to day activities. 6 Minute Walk Test is used to measure the maximum distance that a person can walk in 6 minutes. It is a sub maximal test of aerobic capacity commonly used to assess cardiovascular and pulmonary function.[9] 6 MWT can be performed by many elderly frail people who cannot be tested with standard maximal cycle ergometer or treadmill tests. 10 Step Test is a test that measures the time taken by an individual to step up 10 times. It is a simple, reliable test and requires short time.

However, there is little data available in literature describing variation in test performance for older adults who are functioning independently. The available data are less and often difficult for clinicians to use as a basis of comparison in documentation because they are not presented in terms of age and gender groupings. Hence a study is needed which will give an accurate range of measurements on these tests in different age groups. Thus the aim of the study was to investigate aging related changes in physical and functional, performance and to determine criterion values depending on age in community dwelling elderly people.

METHOD

After the approval of the Institutional Ethics committee TNMC, Mumbai, total 90 subjects were included in the present study and they were divided into 3 groups based on their age. Group A: age group of 61-65 years, Group B: age group of 66-70 years and Group C: age group of 71-75 years of age. N=30 in each group. Type of sampling was a convenience sampling and the source was an urban population in South Mumbai.

Inclusion criteria

1. Subjects between 60 to 75 years of age
2. Both male and female
3. Subjects who can tolerate standing, walking for at least 6 minutes and stepping without any complaints
4. Not dependent on assistance of another person or supportive device for walking or stepping

Exclusion criteria

1. Use of any assistive device for walking or stair climbing
2. Any acute illness in past 3 months
3. Subjects not willing to participate in the study

Outcome measures -1. 6 minute walk test, 2. 10 step test

Subjects who fulfilled the inclusion criteria were taken for the study. All procedure was adequately explained to the patients and written consent was taken from each one before starting the test. **Procedure:** Case record form was filled and demographic data collected from each subject. Resting heart rate, respiratory rate, blood pressure and rate of perceived exertion were taken.

The 6 minute walk test was conducted along a long hallway. Standardized encouragement was given in between at 1, 3, and 5 minutes interval. After completion of test, heart rate, respiratory rate, blood pressure and rate of perceived exertion were taken immediately and after 1, 3 and 5 minutes to see the recovery of subjects to baseline parameters

The 10 step test was conducted after the subject fully recovered from previous test. The subject was asked to step one foot onto a block of 10 cm height and then quickly step down from the block. The same was done with the opposite foot and was repeated 10 times. The subject was instructed to perform the stepping sequence as quickly as possible. Similarly, parameters were taken before and after the test to see the recovery.

The 6 Minute Walk Test distance and Ten Step Test time were statistically analyzed using one way ANOVA with post hoc (Tukey) test.

RESULTS

Table.1: Table showing 6MWD (mts) in the 3 study groups:

	Mean± SD	IQR	Min	Max	Upper 95% CI	Lower 95% CI
Group A	317.13± 35.44	54.0	254	385	330.37	303.9
Group B	297.10± 47.14	65.0	198	380	314.7	279.5
Group C	262.83±42.14	64.0	176	332	278.57	247.1

Table.2: Table showing comparison in between the groups in 6MWD

All Pair wise Multiple Comparison Procedures (Tukey Test):	
Groups	P value
Group A vs. Group B	>0.05
Group B vs. Group C	<0.05*
Group A vs. Group C	<0.05*

*significant

Table.3: Table showing 10 step test time (sec) in the 3 study groups:

	Mean±SD	IQR	Min	Max	Upper 95% CI	Lower 95% CI
Group A	11.36± 2.06	3.62	7.90	16.06	12.18	10.59
Group B	13.24±3.49	2.73	9.11	25.00	14.54	11.94
Group C	14.74±3.16	3.45	10.00	21.62	15.92	13.56

Table.4: Table showing comparison in between the groups in TST time

All Pair wise Multiple Comparison Procedures (Tukey Test)	
Comparison	P value
Group A vs. Group B	<0.05*
Group B vs. Group C	>0.05
Group A vs. Group C	<0.05*

*significant

Results show that 10 Step Test time increased with increasing age in all three age groups. The difference being significant in between groups A & B and between groups A & C.

DISCUSSION

Results showed that there was a progressive decrease in the 6 MWD with age. However, the difference was significant in between age groups B & C ($p<0.05$) and between groups A & C ($p<0.05$). This is supported by studies done by Stephen & Hacker who in their study in 2002 provided reference data for 6MWT in elderly people. Their study showed that there is a progressive decline in the 6MWD with increasing age. [8] 6 MWT also depends on muscular strength, postural balance, general health, nutritional status, orthopedic and cognitive function. As compared to western population, the nutritional status, muscle strength and general health are comparatively lower in Indian population. This may be the reason for lower values of 6MWT in our study.[9]

The results also showed that there was a progressive increase in the time taken to complete TST with age. However, the decrease was more significant between group A & B ($p<0.05$) and between group A & C ($p<0.05$). Kenzo Miyamoto et al. in 2008 showed that there is a progressive increase in the time taken to

complete TST with increasing age. The test also showed high reliability as a test battery.[10] Due to age related changes, the aged are weaker, slower and less powerful and hence, there is a reduction in performances requiring the regulating and coordinating functions of the nervous systems, i.e. balance, reaction time, agility and coordination. Hence, older people cannot perform well in almost any type of activity, except for low intensity activities in which energy demands are easily met.[6] This might be the reason for increase in TST distance.

Cardiopulmonary fitness and skeletal muscle mass progressively decline in aged population and both factors contribute to weakness and functional disability in elderly. These changes might be responsible for the progressive decrease in 6 MWT with increasing age in our study. Cardiopulmonary exercise testing is a well established procedure that provides peak oxygen uptake as the gold standard in determining exercise capacity but it is poorly accessible for a large scale community based investigation. Among the field tests, 6 MWT and TST are easy to administer, inexpensive and safe tests that provide a measure of sub maximal cardio respiratory or endurance fitness.[12]

Steffen and Hacker in their study said that the choice of measurement should be based on how well the specific problems of a given patient match the purpose of a given test.[8] Rather than selecting participants who were healthy (free from any pathologies), older people were selected who functioned independently without assistive devices in the community. People who were independently functioning seemed to be a more realistic standard of comparison for the elderly subjects seen by physical therapists. It was anticipated that the range of performance on the tests by such participants would show substantial variation. Hence, while interpreting the findings, the characteristics of the subjects were kept in mind.

Thus, this study shows the age related changes in functional performance in community dwelling elderly people and provides a criterion related reference values for functional performance tests (6MWT and TST).

Clinical implications: To make a tailored exercise program for elderly people, their functional capacity should be known and accordingly exercises should be prescribed. Most of the Indian population is suffering from one or the other pathology like osteoarthritis, spondylosis, diabetes which is not taken into consideration while planning an exercise program. Such people seem to be a more realistic standard of comparison for elderly subjects seen by physical therapists. The reference values available in litterateur are mainly for healthy elderly people. If we apply these standard values to community dwelling elderly, their functional capacity might be overestimated. In this study, subjects taken were independently functioning in community without the use of assistive devices. Hence, the reference values obtained from this study can be used as a basis of comparison while planning an exercise program for community dwelling elderly people. No research has been done yet by using combinations of these two tests (6MWT and TST) in Indian population. The two tests used in this study are simple to understand and perform and does not require the use of any equipment. Walking and stair climbing are two basic forms of ambulation required in day to day life. By testing performance in these activities, one can come to know the functional capacity of an individual.

Limitations: 1. The sample size was small. 2. Comparison of test values between genders was not analyzed. Females could have had a confounding effect on the test results. 3. Subjects were not compared with different age groups.

CONCLUSION

From the results it can be concluded that there is a progressive decrease in the test performance (6MWT & 10 Step test) with age in community dwelling elderly people. The results of this study can be used as reference values while performing

performance tests on elderly people in the community.

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