

# Correlation between 6 Minute Walk Test and 2 Minute Walk Test to Measure the Functional Capacity in Elderly Population

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**Abstract:** *Background:* Functional capacity is necessary for the elderly individuals to live independently in the community. Although maximal testing could provide a more accurate assessment of functional capacity, a submaximal test would be more desirable as it would be safer and maximal testing would be contradicted due to medical illnesses. Walk test is an easy and reliable tool in fitness management in elderly individuals. The American Thoracic Society has recommended the 6 minute walk test and published its guidelines for its administration. However due to its duration, its administration becomes difficult in busy settings. Also, some elderly individuals aren't able to complete it due to decreased functional capacity. (1) So, Butland et al in 1982 proposed the 2 minute walk test and its guidelines are same as that of 6 minute walk test but less time consuming. *Method:* The sample was recruited first using the Berg Balance Scale and individuals whose score was below 45/56 were ruled out. A written consent was taken from them. Prior to starting the test; Age, Height, Weight, Basal Pulse Rate, Respiratory Rate Blood Pressure and Oxygen saturation levels were recorded. The Borg scale of exertion was explained and they were asked to rate it before and after the test. The test was administered in a randomized order through chit picking and the individual was asked to walk the 30-metered leveled surface for 6 minutes and 2 minutes both with a break of 1 hour between them. The above-mentioned vitals were recorded pre and post the tests. *Results:* The results show that the Pulse Rate, Respiratory Rate, RPE scale and Distance positively co-relate amongst the two tests. However the Blood Pressure and SpO<sub>2</sub> (oxygen saturation levels) didn't co-relate amongst the two tests. *Conclusion:* The study concludes that parameters like pulse rate, respiratory rate, distance and RPE scale can be assessed using the 2 minute walk test. It's a good prognostic tool and retesting would be easy amongst the geriatric population. Therefore since the values correlate, 2-minute walk test results can be used to design a treatment protocol similar to that based on 6-minute walk test results.

**Keywords:** 6-minute walk test, 2-minute walk test, functional capacity, geriatric population

## 1. Introduction

Functional capacity is necessary for these elderly individuals to live independently in the community.(2)

There are various incremental tests used namely, the shuttle walk test or the 3 minute step test for measuring the functional capacity which are used for outcome measurements like treatment and rehabilitation purpose. But these are intense and questionable in regards to frail individuals in the geriatric population.

Although maximal testing would provide a more accurate assessment of functional capacity, a submaximal testing would be desirable in geriatric population as it would be safer and maximal testing would be contradicted due to medical issues.

Walk tests are a significant tool in screening and management of elderly individuals. They are considered more reliable than other performance-based tests such as timed chair stand test.

The American Thoracic Society has recommended the 6-minute walk test and published its guidelines for its administration. The duration of this test makes it difficult to administer especially in busy settings and when numerous individuals have to be tested. Also some elderly individuals aren't able to complete it due to decrease in functional capacity.(1) This has lead to the recommendation and use of a shorter walk test i.e. the 2-minute walk test.

The 2-minute walk test was proposed by Butland et al in 1982. Its guidelines are the same as that of 6-minute walk test but are less time consuming.

Numerous studies have been done with 2-minute walk test with older individuals who have various respiratory and cardiac issues. There are very few studies, which show a correlation between the 2 and 6-minute walk test for measuring the functional capacity.

So, therefore the purpose of this study is to find if there is a correlation between the vitals recorded during the 6-minute and 2 minute walk test.

## 2. Method

### 2.1 Study Design

- Study type : Correlational study
- Place of study : Community
- Sample size : 39
- Study duration : 6 months
- Study population : 65-75 years
- Study subjects : Both males and females

### 2.2 Criteria for Selection

#### Inclusion Criteria:

- Age between 65 to 75 years
- Both Male and Female

**Exclusion Criteria:**

- Any musculoskeletal, neurological or cardiorespiratory limitations resulting in contraindication to perform the walk tests (e.g.: recent MI, angina, etc.)
- Berg balance scale score less than 45/56

**3. Method of Study**

- The sample was recruited by first using the Berg Balance Scale on the subject, and only when the score was above 45/56 that they were eligible to participate in my study.
- All participants were asked to sign a consent letter before testing.
- Prior to starting, the age, height, weight was taken.
- Basal HR and BP, RR and SPO2 were noted.
- The Borg scale of perceived exertion was explained to the subject before the walk test and asked to rate the perceived exertion before and after the walk test.
- The tests were administered in a random order by the chit picking method.
- The subject was asked to perform the 6-minute walk test and 2-minute walk test separately and the necessary readings were taken.
- The subject was asked to walk as far as he could over a 30 meter leveled surface between the markers for 6 minutes.
- A non-slippery leveled surface was chosen for the assessment.
- The subject was asked to walk at his normal pace and not run or jog.
- The subject was instructed that he can slow down, stop or pause during the 6 minutes. But he has to resume his walk as soon as he's able to.
- Post 6 minutes his above-mentioned vitals were recorded.
- A break of 1 hour was given in between the two tests to prevent fatigue and accumulation of lactic acid.
- The subject was then asked to walk the 30 meter leveled surface between the markers for 2 minutes.
- Post 2 minutes his above-mentioned vitals were recorded and the instructions for the test remained the same as for 6-minute walk test.
- All the readings were taken and cumulated for analyses of data.
- The outcome measures include:
  - Blood Pressure
  - Heart Rate
  - Respiratory Rate
  - Distance
  - Borg scale of exertion
  - Oxygen Saturation Levels
- The pre and post readings were taken of the same. Statistical method: The prism app was used to do the statistical analysis. The spearman correlational test was used to find the results.

**4. Results**

The Pulse Rate, Respiratory Rate, RPE Scale and the Distance positively correlated amongst the two tests.

However the Blood Pressure and SPO2 (oxygen saturation levels) didn't correlate.

The reason for Blood Pressure not correlating could be that there were many subjects that were having hypertension and there was some time variation between having the anti-hypertensive drugs and performance of the tests.

Similarly, for oxygen saturation levels, the population chosen for performing the tests was normal healthy exercising individuals who didn't have any respiratory or cardiac condition. They were able to cope up with the submaximal tests without many changes in the oxygen saturation levels. So the response was without many variations in their levels.

**5. Discussion**

The 6-minute and the 2- minute walk tests are submaximal tests, which measure the functional capacity of an individual in the activities of daily living. The subject is asked to walk as far as he can for 6 minutes and 2 minutes separately on a leveled 30m surface. The pre and post vitals are recorded for the same. There could be certain individuals in the geriatric population who may find it difficult to complete the 6-minute walk test and it could be time consuming too. So for such individuals a shorter walk test could be used as an alternative.

The 2- minute walk test is widely used amongst patients who are suffering from respiratory or cardiac issues like COPD, or amongst patients who are amputated or having any neuromuscular problems etc. But not many studies are done in normal geriatric population.

Therefore this study has been conducted in this article where randomly 39 subjects (both male and female) were selected who fulfill the inclusion and exclusion criteria and a 6 minute walk test and 2 minute walk test was done separately on them with an interval of an hour. All the subjects could complete both the tests.

The following results were found:

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**6. Conclusion**

The study concludes that parameters like pulse rate, respiratory rate, distance and RPE scale can be assessed using the 2 minute walk test. It's a good prognostic tool and retesting would be easy amongst the geriatric population.

Therefore since the values correlate, 2-minute walk test results can be used to design a treatment protocol similar to that based on 6-minute walk test results.

**7. Acknowledgment**

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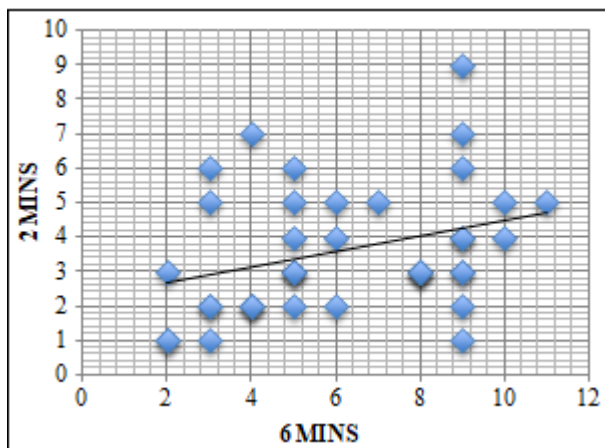
Last but not the least I would like to thank my parents, grandparents and my aunt who helped me from the beginning till the end with their support, guidance and encouragement.

Also I would like to extend my sincere esteems to all my subjects who willingly and happily participated in my project.

**Tables and Graphs**

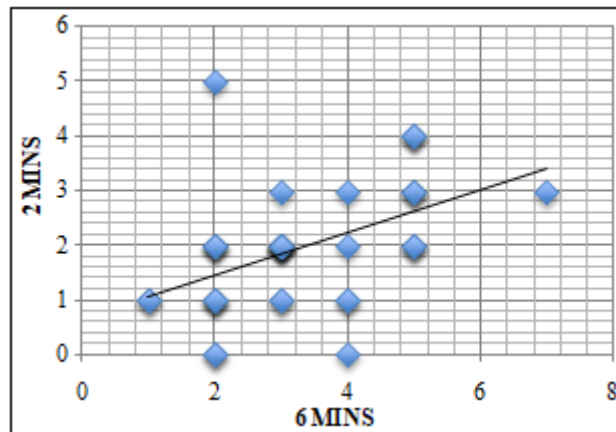
The following outcome measures positively co-related:

**1) Pulse Rate:**



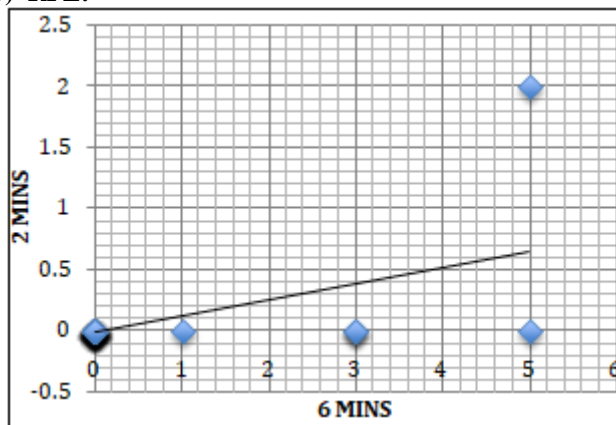
	Mean	SD	p - Value	r - Value
6 Minutes	6.179	2.664	0.0101	0.3709
2 Minutes	3.615	1.872	0.0101	0.3709

**2) Respiratory Rate**



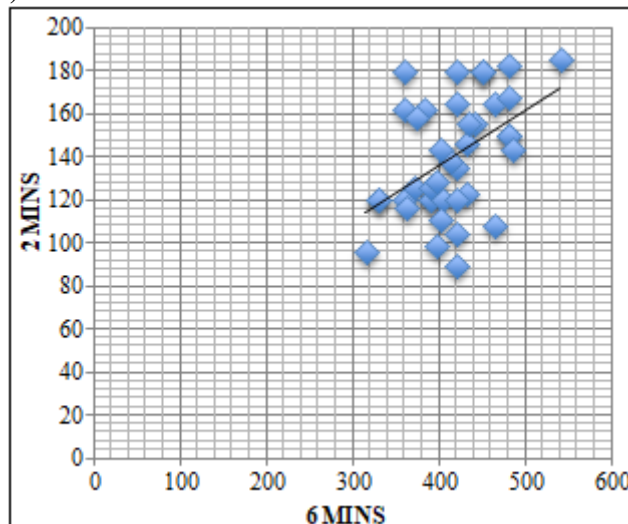
	Mean	SD	p - Value	r - Value
6 Minutes	3.308	1.379	0.0002	0.5377
2 Minutes	1.974	1.135	0.0002	0.5377

**3) RPE:**



	Mean	SD	p - Value	r - Value
6 Minutes	0.5128	1.335	0.0035	0.4249
2 Minutes	0.05128	0.3203	0.0035	0.4249

**4) Distance:**



	Mean	SD	p – Value	r - Value
6 Minutes	414.6	48.80	0.029	0.4331
2 Minutes	140.0	27.10	0.029	0.4331

The following outcome measures didn't co – relate:

### 1) Systolic Blood Pressure

	Mean	SD	p – Value	r - Value
6 Minutes	10.26	4.284	0.3204	0.07710
2 Minutes	3.846	4.929	0.3204	0.07710

### 2) Diastolic Blood Pressure

	Mean	SD	p – Value	r - Value
6 Minutes	8.718	6.561	0.4750	0.01039
2 Minutes	4.103	4.983	0.4750	0.01039

### 3) SpO2

	Mean	SD	p – Value	r - Value
6 Minutes	1.385	0.9629	0.3258	0.07465
2 Minutes	0.6410	0.8425	0.3258	0.07645

## References

- [1] Richard C Gershon , Physical Medicine and Rehabilitation, 2015
- [2] D.M. Connelly, B.K. Thomas, and S.J. Cliffe, <https://doi.org/10.3138/physio.61.2.78>, May 12,2009
- [3] Brooks D ,Aging,2007
- [4] Brooks D, Davis AM,,Physical Medical Rehabilitation, January 2006
- [5] Dourado VZ.[Reference equations for the 6-minute walk test in healthy individuals]. *Arq Bras Cardio* 2011;96(6):128-138
- [6] Brooks D,Parsons J, Tran D, Jeng B, Gorczyca B, Newton J, et alThe two- minute walk test as a measure of functional capacity in cardiac surgery patients. *Arch Phys Med Rehabilitation* 200485(9):1525-1530.
- [7] Balke B. A simple field test for the assessment of physical fitness. *CARI Report*
- [8] Cahalin LP, Mathier MA, Semigran MJ, Dec GW, DiSalvo TG. The six-minute walk test predicts peak oxygen uptake and survival in patients with advanced heart failure. *Chest* 1996 M147–M151
- [9] <http://www.thoracic.org/statements/resources/pfet/sixminute.pdf>
- [10] Kervio G, Carre F, Ville NS, Reliability and intensity of the six-minute walk test in healthy elderly subjects. *110:325–332.*