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Correlation of six minute walk distance test and physical activity score with demographic variables

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Abstract

The present study aimed to find out the correlation between six minute walk distance test (6MWD) and physical activity score and their relation with demographic variables. The objectives of the present study were a) to determine the correlation between physical activity score and Six Minute Walk Test Distance of healthy adults; b) to find out correlation between physical activity score and demographic variables of healthy adults and c) to find out the correlation between Six Minute Walk Test Distance and demographic variables of healthy adults. The study design was correlational design which was conducted on 41 male and 14

female participants (total 55 subjects) with age group 20- 45 years. The main variables of the present study were I.A.P.Q. Questionnaire (Long form) and 6 Minute Walk Distance. Demographic data and all study variables were analyzed using Independent sample t-test and Pearson correlation test (SPSS version 2.0). The significance level set for this study was 95% ($p < 0.05$). It was found that there is no correlation between 6MWD and Physical Activity Score ($r = -0.245$, $p = 0.071$) at the significant level of 0.05. But the results of the present study were significantly correlated with age and sex differences of the subjects.

Keywords: Physical activity, fitness, 6MWD test, demographics, chronic diseases

Introduction

Any movement produced by muscle action which increases the energy expenditure is referred as physical activity. It describes activities that are beyond your daily routine of sitting, standing, and walking up stairs (McArdle *et al*, 2010) [13]. Regular moderate intensity physical activity such as walking, cycling, or participating in sports has significant benefits for health. For instance it can burn calories, reduce body fat, maintain body weight, reduce the risk of cardiovascular diseases, diabetes, colon and breast cancer, and depression and help in imparting fitness and ability to perform daily activities (Guyatt *et al*, 1985) [10]. Physical activity has by far the most profound effect on human energy expenditure. MET is defined as multiples of resting metabolic rate. One MET is equal to resting oxygen consumption or about 250 ml/min for an average man and 200 ml/min for an average woman. MET is expressed in terms of oxygen consumption per unit body mass. The intensity of leisure time physical activity in absolute MET and relative (% VO_2 max) intensity for various age categories. 1 MET = 3.5 ml/kg/min. Most people can sustain metabolic rate 10 times the resting value during continuous "big muscles" exercise (McArdle *et al*, 2010) [13]. There are various examples for physical activity such as fast walking, bicycling, gardening, swimming etc. There are various tools for measuring physical activity. These are 6 minute walk distance test (6MWD) and Physical Activity Score Questionnaire, New Zealand Physical Activity Questionnaire (Short Form), cardiopulmonary stress test. The 6MWD is a simple and inexpensive test which is widely used to assess the physical activity and in chronic diseases such as heart failure and chronic pulmonary obstructive diseases (Guyatt *et al*, 1985) [10]. Insufficient physical activity is the cause of progression of many diseases. Distance walked during 6MWD can be influenced by demographic, anthropometric and physiological factors in healthy individuals as well as in patients with chronic diseases. Several external complicating factors, such as effort spent and motivation also affect the performance during 6MWD. As the walking velocity during the 6MWD is self-controlled, so the 6MWD is extremely variable in healthy individuals. Reference equations for the 6MWD have been developed for children and adolescents, adult individuals and healthy elderly individuals. Validity and reliability of six minute walk test was also well established (Troosters *et al*, 1999) [15]. International Physical Activity Questionnaire (IPAQ) is widely used to measure the physical activity across the world (Ainsworth *et al*, 2006) [1]. IPAQ measures frequency, duration and intensity of physical activity in 4 domains of life: work, transport, domestic and garden and leisure-time. Studies have shown an acceptable validity and reliability of IPAQ for use in population-based studies of physical activity (Craig *et al*, 2003; Deng *et al*, 2008) [5, 7]. To best of our knowledge there is no study available on the correlation between Physical Activity Score and Six Minute Walk Distance. The aim of our study is to find the correlation between

6MWD test and physical activity and to determine the correlation of 6MWD and physical activity score with demographics variables.

Objectives

To study the correlation of six minute walk distance test and physical activity score with demographic variables in 20-45 years population.

Research questions

Is there any correlation between physical activity score and Six Minute Walk Test Distance of healthy adults?

Is there any correlation between physical activity score and demographic variables of healthy adults?

Is there any correlation between Six Minute Walk Test Distance and demographic variables of healthy adults?

Methodology

A convenient sample of 55 subjects both male and female with age between 20-45 years was enrolled from university campus.

Study design

Correlation study design

Protocol

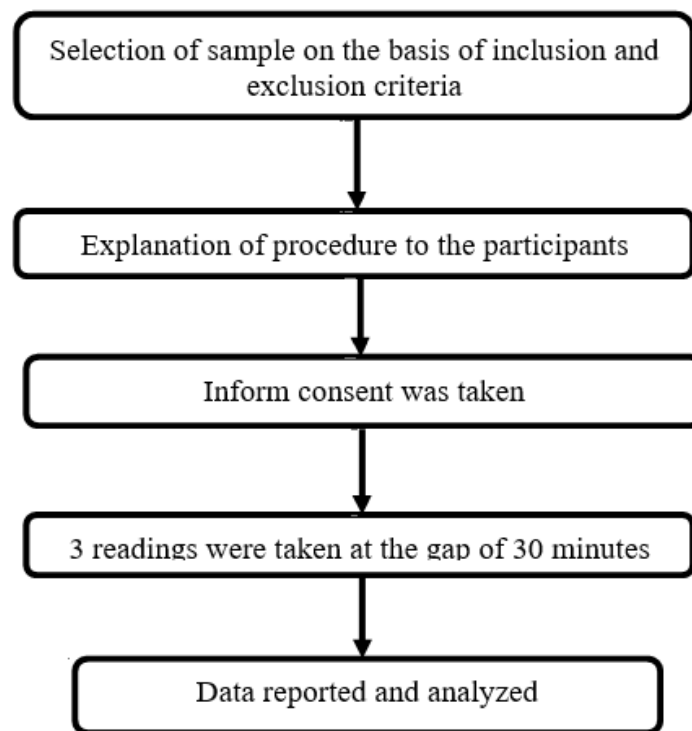


Fig 1: Protocol of the present study

Procedure

Initially subjects were assessed for inclusion and exclusion criteria and were informed about the nature and the study and given full verbal assessment and written consent prior to the study was taken from each subject. Then personal data and Questionnaire was filled by the subjects. After completion of Questionnaire (long form) then height and body weight were recorded and BMI was calculated (Fogelholm *et al*, 2006)^[10]. Lower limb power was assessed through 'quick test' before 6 min walk test performance. The walking test was performed

Inclusion criteria

- Healthy adults
- Age between 20-45 years

Exclusion criteria

- Chronic smokers
- Any musculoskeletal, neurological, cardiopulmonary and metabolic disorder with limit person's stability to perform the test.
- Any psychological condition and uncooperative attitude of the subject.

Variables

I.A.P.Q. Questionnaire (Long form)

6 Minute Walk Distance

Instrumentation

- A 30 meter, pre-measured flat walking area with interval marking every 5 meters.
- Stop watch
- Bright color tape to mark boundaries of the course
- Measuring tape
- Chair
- Data collection form
- I.P.A.Q. Questionnaire (Long form)

in an outdoor, unobstructed 30-m long corridor, according to the recommendations of Guyatt *et al* (1985)^[10] and as per ATS Guidelines (2002). All subjects were informed in a standardized manner (Demers *et al*, 2001) of the purpose and method of the test before the test is performed. The subjects were advised on the possibility of slowing down the pace and stopping or resting as needed to resume walking as soon as they felt they were able to do so. During the test, after each minute the subjects were encouraged as per ATS guidelines. No additional encouragement was given. After 6 minutes, the

subjects were instructed to stop walking and remain at the same place where they were made to sit. The total distance was derived by multiplying the number of laps by the circumferences of the walking circle and adding the distance covered in last lap which was measured by a measuring tape. The test was supervised by a physiotherapist and there is 30 minutes rest time between every reading. Three readings of each subject were recorded and 30 minute rest time was given after each reading. Then the mean of three readings was calculated.



(A)



(B)

Fig 2: (A) and (B) Six minute walk distance test

Data analysis

The software package SPSS 20.0 was used for data analysis. Demographic data and all study variables were analyzed using Independent sample t-test and Pearson correlation test. The significance level set for this study was 95% ($p < 0.05$).

Results

Of the 55 subjects, who entered into the study, 41 were male and 14 were female.

Table 1.1 shows the mean and standard deviation of all the demographic Variables.

Table 1: Demographics details of the participants

Demographics	Mean	SD
Age	33.654	9.569
Height	162.43	9.523
Weight	62.372	14.893
BMI	23.428	4.291

A. Six Minute Walk Test Distance

Table 1.2 shows that 6 minute walk test distance is significantly correlated with Age ($r = -0.446$, $p = 0.000$) and Height ($r = 0.498$, $p = 0.000$) but there is no significant correlation of 6 minute walk test distance with weight ($r = 0.124$, $p = 0.366$) and BMI ($r = -0.183$, $p = 0.179$) at the 0.05 level of significance.

Table 2: Pearson correlation between demographic variables and 6 Minute Walk Distance

Factors	r -value	p-value
Age with 6 MWD	-0.446	0.000
Height with 6 MWD	0.498	0.000
Weight with 6 MWD	0.124	0.366
BMI with 6 MWD	-0.183	0.179

BMI = Body Mass Index, 6MWD= 6 Minute Walk Distance
 Additionally it is found that the mean of 6 minute walk distance in male (639.813) is more than that of female (582.607) as shown in figure 1.3. Independent t-test for mean shows that there is significant difference in 6 minute walk distance between male and female (p -value 0.028) at the significant level of 0.05 and Degree of Freedom 53 as shown in table 1.3.

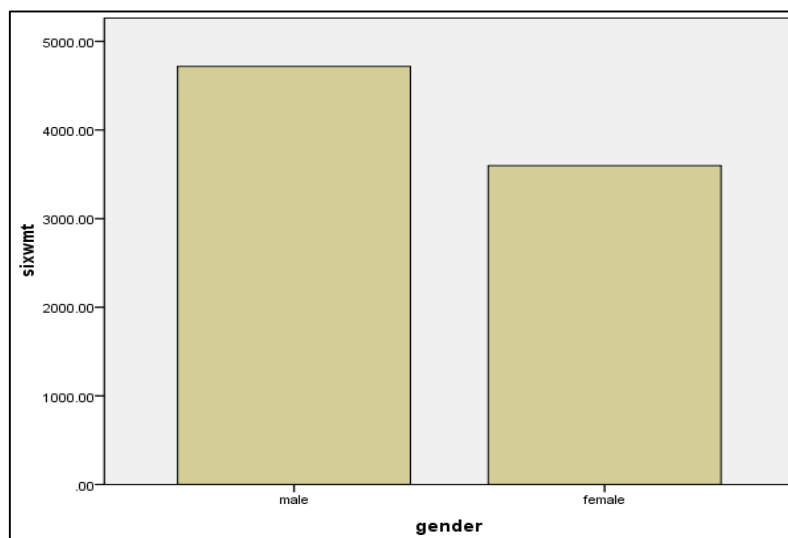


Fig 3: Mean of Six Minute Walk Distance in Male and Female

Table 3: Mean change in Male and Female in Six minute walk distance

Gender	Mean± SD	t-value	p-value
Male	639.813±83.245	2.260	0.028
Female	582.607±77.138		

B. Physical Activity Score

Table 1.4 shows that Physical Activity Score is significant correlated with Age ($r= 0.365, p=0.000$, but not significant correlation with Height ($r=0.183, p=0.180$), weight ($r=0.098, p=0.976$) and BMI($r=0.016, p=0.906$) at 0.05 level of significance.

Table 4: Correlation of physical activity score and demographics

Factors	r-value	p-value
Age with Physical Activity Score	0.365	0.000
Height with Physical Activity Score	0.183	0.180
Weight with Physical Activity Score	0.098	0.976
BMI with Physical Activity Score	0.016	0.906

Additionally it is found that the mean of Physical Activity Score in male ($3387.183±2223.714$) is more than that of Female ($3593.107±2341.847$) as shown in Figure 1.4. Independent t-test for mean showed that there is significant difference in Physical Activity Score between male and female (p -value 0.776) at the significant level of 0.05 with Degree of Freedom 21.572 as shown in table 1.5.

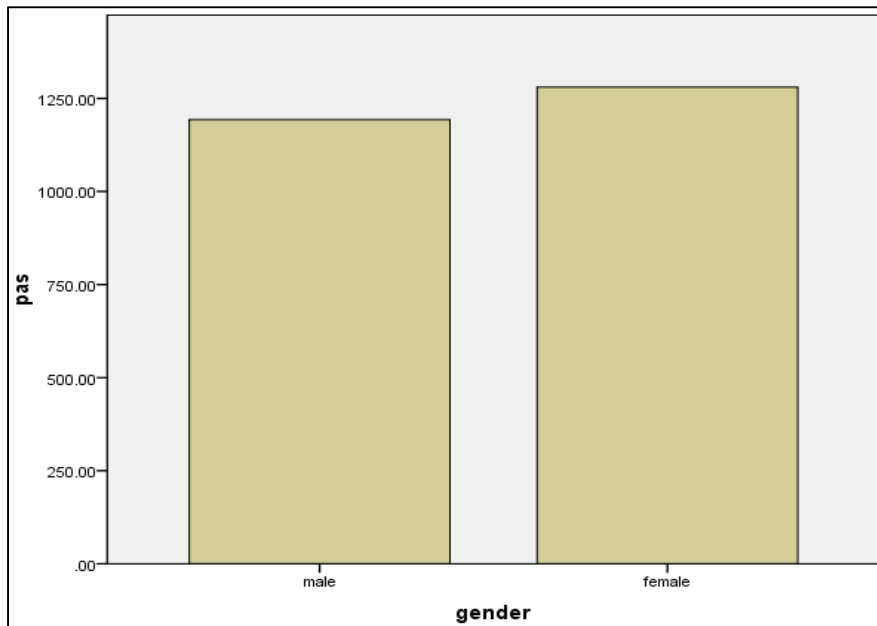


Fig 4: Mean of Physical Activity Score in Male and Female

Table 5: Mean in male and female in Physical Activity Score

Gender	Mean± SD	t-value	p-value
Male	3387.183±2223.714	-0.28	0.776
Female	3593.107±2341.847		

Table 1.6 shows that there is no significant correlation between Physical Activity Score and 6 minute walk distance ($r = -0.245, p=0.071$) at the significant level of 0.05.

Table 6: Pearson Correlation between Physical Activity Score and 6 minute walk distance

Components	r-value	P-value
Physical Activity Score and 6 minute walk test	-0.245	0.071

Discussion

The study was conducted to determine the correlation between six minute walk distance and physical activity score and their correlation with demographic variables. The results of the study support that there is insignificant correlation between 6MWD and physical activity score in Healthy adults. From this study, it is seen that there is non-significant correlation between six minute walk distance and physical activity score ($r = -0.245, p=0.071$) but significant correlation with age and sex of the subjects. These findings are supported by a study (Fernandes *et al*, 2016) [8] which showed that age and sex are the independent predictors of 6MWD in healthy

population. The present study found that the Physical Activity Score in male ($3387.183±2223.714$) is more than that of Female ($3593.107±2341.847$). A previous study found (Al-Hazzaa, 2007) [2] that females were engaged more in moderate physical activity than males, whereas males participated more in vigorous activity compared with females. Previous studies (Hallal *et al*, 2003; Burton & Turrell, 2000) [11, 4] had revealed that men were physically more active than women because of different pattern of physical activity between them. According to Norman *et al* (2002), physical activity decreases with age. The decrease in physical activity with age was attributed both to lower level of work occupational activity and of lower leisure time activity of old persons. Non-significant correlation between physical activity and height may be because none of the question of the Questionnaire, which is used for calculating physical activity, is correlated with height. Weight and BMI are also not correlated with physical activity score. Norman *et al* found that BMI was inversely correlated with physical activity. Furthermore, Hulens *et al* (2003) [12] found that morbidity obese women with BMI more than 35 kg m^{-2} walk significantly slower than the lean women.

Limitation

As the study was conducted on healthy adults so the sample size must be large. So the small sample size is only limitation of the present study.

Conclusion

International Physical Activity Questionnaire (long Form) of a healthy adult is insignificant correlated with six minute walk test but significantly correlated with age and sex of the participants.

Future recommendations

There is scope of the further study using larger sample size so that the result can be generalized and move vigorous sub analysis can be done. Further studies can be conducted to compare the physical performance and 6 minute walk distance between male and female from general population. It will be interesting to study further correlation of physical performance and physical activity score between male and female both at different age groups.

References

1. Ainsworth B, Macera CA, Jones DA, Reis JP, Addy CL, Bowles HR, *et al.* Comparison of the 2001 BRFSS and the IPAQ Physical Activity Questionnaires. *Medicine and science in sports and exercise.* 2006; 38(9):1584-1592.
2. Al-Hazzaa HM. Health-enhancing physical activity among Saudi adults using the International Physical Activity Questionnaire (IPAQ). *Public health nutrition.* 2007; 10(1):59-64.
3. ATS Statement. Guidelines of the six minute walk test; *AmJRespircrit care Med* 2002, 166:111-7.
4. Burton NW, Turrell G. Occupation, hours worked, and leisure-time physical activity. *Preventive medicine.* 2000; 31(6):673-681.
5. Craig CL, Marshall AL, Sjöström M, Bauman AE, Booth ML, Ainsworth BE, *et al.* International physical activity questionnaire: 12-country reliability and validity. *Medicine & science in sports & exercise.* 2003; 35(8):1381-1395.
6. Demers C, McKelvie RS, Negassa A, Yusuf S. Resolved Pilot Study Investigators. Reliability, validity, and responsiveness of the six-minute walk test in patients with heart failure. *American heart journal.* 2001; 142(4):698-703.
7. Deng H, Macfarlane D, Thomas G, Lao X, Jiang C, Cheng K, *et al.* Reliability and validity of the IPAQ-Chinese: the Guangzhou Biobank Cohort study. *Medicine+ Science in Sports+ Exercise.* 2008; 40(2):303.
8. Fernandes L, Mesquita AM, Vadala R, Dias A. Reference equation for six minute walk test in healthy western India population. *Journal of clinical and diagnostic research: JCDR.* 2016; 10(5):CC01.
9. Fogelholm MIKAEL, Malmberg JARMO, Suni J, Santtila MATTI, Kyröläinen H, Mäntysaari M, *et al.* International physical activity questionnaire: validity against fitness. *Medicine and science in sports and exercise.* 2006; 38(4):753-760.
10. Guyatt GH, Sullivan MJ, Thompson PJ, Fallen EL, Pugsley SO, Taylor DW, *et al.* The 6-minute walk: a new measure of exercise capacity in patients with chronic heart failure. *Canadian medical association journal.* 1985; 132(8):919.
11. Hallal PC, Victora CG, Wells JCK, Lima RC. Physical inactivity: prevalence and associated variables in Brazilian adults. *Medicine & Science in Sports & Exercise.* 2003; 35(11):1894-1900.
12. Hulens M, Vansant G, Claessens AL, Lysens R, Muls E. Predictors of 6-minute walk test results in lean, obese and morbidly obese women. *Scandinavian journal of medicine & science in sports.* 2003; 13(2):98-105.
13. McArdle William D, Katch Frank I, Katch Victor L. *Exercise physiology: and nutrition, energy, and human performance (7th eds)*, MD: Lippincott Williams and Wilkins, 2010, 197-200.
14. Norman A, Bellocco R, Vaida F, Wolk A. Total physical activity in relation to age, body mass, health and other factors in a cohort of Swedish men. *International journal of obesity.* 2002; 26(5):670-675.
15. Troosters T, Gosselink R, Decramer M. Six minute walking distance in healthy elderly subjects. *European Respiratory Journal.* 1999; 14(2):270-274.