



CORRELATION OF FUNCTIONAL CAPACITY AND WAIST CIRCUMFERENCE IN NORMAL INDIVIDUAL IN AGE GROUP OF 20-30 YEARS

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ABSTRACT

Objective: To correlate functional capacity and waist circumference in normal individual in age group of 20-30 years.

Background: The extent to which a person can increase exercise intensity and maintain increase level depend largely on cardiovascular fitness. Functional capacity is the ability of an individual to perform aerobic work as defines by the maximal oxygen uptake .It is a physical capacity to perform activities of daily living in a safe and independent manner without undue fatigue. Physical exercise may constitute a valuable tool in attempting to implement more efficient therapeutic approaches that effectively improve functional capacity and quality of life. A recent review of functional walking test concluded that 6MWT is easy to administer, better tolerated and more reflective of functional capacity than the other walk test. Waist circumference is more accurate measure of the distribution of body fat has been shown to be most strongly associated with morbidity and mortality.

Methodology: 60 females will be taken according to the above mentioned selection criteria for the study. Prior to the study a written inform consent will be taken from each subject in the language best understood by them. Each subject's waist measurement will be taken prior to the test. Each subject is categorized according to BMI. A 6MWT will be performed outdoors, along a long, flat, straight, corridor with a hard surface. The working course will be 30 m in length. Starting line which marks the beginning and end of each 60 m lap will be marked on the floor using brightly coloured tape. The subjects will be made to sit and rest in chair located near the starting position for at least 10 minutes during this time basic parameters blood pressure, respiratory rate and pulse pressure will be noted and Borg scale will be taken in standing position at rest. The subject will be instructed. The objective of this test is to walk as far as possible for 6 mins. Subject should walk "FAR AS POSSIBLE" for six minute but don't run or jog. Ask the subject to start 6MWT. When the 6 mins are over say this: "Stop!" Walk over the patient taking the chair. And then again parameters will be taken in 1min, 3mins after the test. Document the number of laps and calculate the total distance walked, rounding the nearest meter.

Result and Conclulsion: Total score was calculated and the results were interpreted. The results showed that there is negative correlation between functional capacity and waist circumference in normal healthy individual in age group of 20-30 years.

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INTRODUCTION

The extent to which a person can increase exercise intensity and maintain increase level depend largely on cardiovascular fitness⁸.

Functional capacity is the ability of an individual to perform aerobic work as defines by the maximal oxygen uptake⁸. It is a physical capacity to perform activities of daily living in a safe and independent manner without undue fatigue⁷. A set of attributes that people have or achieve that relates to ability to perform functional activity. Being physically unfit leads to

problems like overweight, obesity and other cardiovascular problems¹⁵. Benefits of physical fitness include reduces risk of decrease and fight depression, provide better health, lower your cholesterol levels and maintenance of optional body weight, builds stronger bones, joints and ligaments, relaxation and stress relief and postpones fatigue³. Physical exercise may constitute a valuable tool in attempting to implement more efficient therapeutic approaches that effectively improve functional capacity and quality of life¹⁸.

Six-Minute Walk Test is a practical simple test that requires a 100ft hall way, but no exercise equipment or advance training for technicians. It is an activity performed daily by all but the most severely impaired patient. A recent review of functional walking test concluded that 6MWT is easy to administer,

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better tolerated and more reflective of functional capacity than the other walk test. Most patient do not achieve maximal exercise capacity during 6MWT, instead they choose their own intensity of exercise and are allowed to stop and rest during the test. Most activities of daily living are performed at submaximal level of excursion so 6MWT may better reflect the functional capacity of daily physical activity. It evaluates global and integrated responses of the system including pulmonary and cardiovascular system, systematic circulation, peripheral circulation, blood, neuro muscular unit and muscle metabolism. It assesses the submaximal level of functional capacity¹.

Waist circumference is more accurate measure of the distribution of body fat has been shown to be most strongly associated with morbidity and mortality^{4, 16}. Body fat distribution is an important risk factor for obesity-related diseases. Excess abdominal fat is associated with an increased risk of cardiometabolic disease. However, precise measurement of abdominal fat content requires the use of expensive radiological imaging techniques. Therefore, waist circumference (WC) is often used as a surrogate marker of abdominal fat mass, because WC correlates with abdominal fat mass and is associated with cardio metabolic disease risk⁶. The extra fat found around the middle is an important factor in health, even independent of BMI⁵. It is measured at the midpoint between the lower border of rib cage and the iliac crest. It is convenient and simple measurement that is unrelated to height. It gives approximate index of intra-abdominal fat mass¹³. Increase in waist circumference will decrease the lung expansion which inturn relate in hypoventilation⁹. Changes in waist circumference reflect changes risk factors for cardiovascular disease and other form of chronic disease metabolic complication for men > 102cm and women > 88cm¹³.

MATERIAL AND METHOD

Study Design

Type of study: Cross sectional study

Duration of study: 1 year.

Place of study: Metropolitan city

Study Design

Sample size: 60

Sample population: 60 females

Sampling: Convenient sampling.

Selection Criteria

Inclusion criteria

- Normal healthy females willing to participate.
- Age group 20-30 years

Exclusion criteria

- Any diagnosed cardiovascular/respiratory/musculoskeletal.
- Neurological disorder.
- Psychiatric illness.
- H/O fracture of lower limb.
- Any congenital abnormality involving lower limb.

Material Used

Pen
Paper

Stop watch
Stethoscope
Measuring tape
Sphygmomanometer
2 cones
Borg scale

Procedure

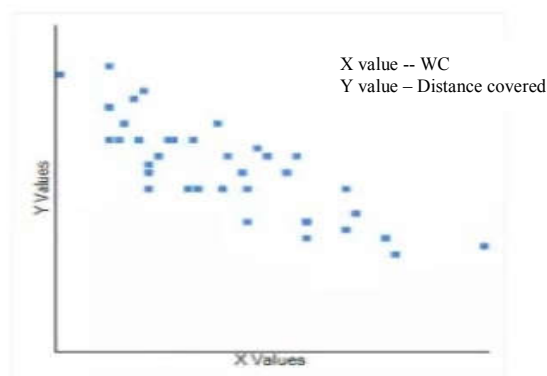
60 females will be taken according to the above mentioned selection criteria for the study. Prior to the study a written inform consent will be taken from each subject in the language best understood by them. Each subject's waist measurement will be taken prior to the test. Each subject is categorized according to BMI. A 6MWT will be performed outdoors, along a long, flat, straight, corridor with a hard surface. The working course will be 30 m in length. The length of a corridor will be marked every 3 m the turnaround point should be marked with a cone. Starting line which marks the beginning and end of each 60 m lap will be marked on the floor using brightly coloured tape. The subjects will be made to sit and rest in chair located near the starting position for at least 10 minutes during this time basic parameters blood pressure, respiratory rate and pulse pressure will be noted and Borg scale will be taken in standing position at rest. The subject will be instructed as follows: The objective of this test is to walk as far as possible for 6 mins. You will be walking back and forth around the cones. 6 mins a long time to walk, so you will be exerting yourself. You will probably get out of breadth or become exhausted. You are permitted to slow down and to rest as necessary, but resume walking as soon as you are able. Subjects were told therapist will keep a record of number of laps completed. Subject should walk "FAR AS POSSIBLE" for six minute but don't run or jog. Ask the subject to start 6MWT. When the 6 mins are over say this: "Stop!" Walk over the patient taking the chair. And then again parameters will be taken in 1min, 3mins after the test. Document the number of laps and calculate the total distance walked, rounding the nearest meter. In healthy subjects, the six minutes' walk distance ranges from 400-700 meter.

RESULTS

After 1 year of study data was analyzed using Pearson Correlation Coefficient. Study showed that there is negative correlation between functional capacity and waist circumference in normal healthy individual in age group of 20-30 years.

Graphs and table

Correlation of functional capacity and waist circumference in normal healthy individual

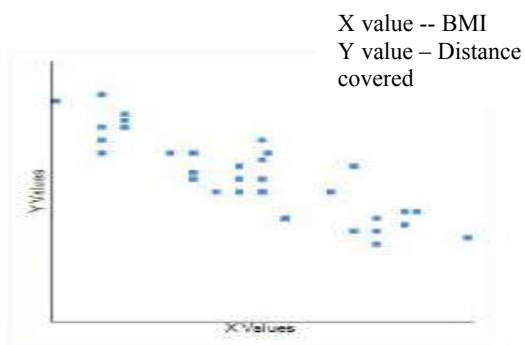


Variable	Mean	SD	r value	p value
Waist circumference	84.28	22.73	-0.8394	0.00001
6 Minute Walk Test	444.74	111.77		

Inference

Pearson’s Correlation Coefficient shows the scatter diagram where the relationship indicates negative correlation, as the values of the two variables move in the opposite direction.

Correlation of Functional Capacity and Bmi in Normal Individual



Variable	Mean	SD	r value	p value
BMI	24.52	4.531		
6 Minute Walk Test	444.745	111.77	-0.8518	0.00001

Inference

Pearson’s Correlation Coefficient shows the scatter diagram where the relationship indicates negative correlation, as the values of the two variables move in the opposite direction.

DISCUSSION

The purpose of this study was to examine the relationship between waist circumference and functional in normal healthy individual. However, this trend is prevalent in obese and elderly subject due to ageing.

Being overweight makes any physical activity uncomfortable and reduces physical activity interest, which fosters the development of a vicious cycle. Increase in fat mass, fat free mass or visceral fat mass, increase the body composition. Also age related changes occur in waist circumference. Because of central obesity, there’s hypoventilation, reduced surface area of the alveoli for gaseous exchange. So ventilation perfusion ratio is mismatched oxygen transport is hampered throughout which causes reduce oxygen supply to peripheral muscle, so fatigue sets in faster and so functional capacity is reduced².

A recent study found that total body fat and central adiposity were inversely associated with lung function¹⁷.

Respiratory function is determined by the interaction of lungs, chest wall and muscles¹⁴. Truncal obesity reduces chest wall compliance, respiratory muscles function and peripheral airway size¹⁰.

In a study by Lars-Goran Ekelund, stated that a lower level of physical fitness was associated with a higher risk of death from cardiovascular and coronary heart disease¹². Physiological functional capacity is dependent on body size and system efficiency. Therefore, exercise adaption is influenced by body

growth and is influenced by body growth and pubertal development.

Obesity is related to sedentary lifestyle which affects performance and also to increased fat mass relative to muscle mass per unit of body weight².

In women, estrogen is believed to be cause of fat stored. The 6MWT results are due to physiological changes like increase in heart rate, increase in cardiac output and increase in blood flow. The obese group walked a shorter distance then the conclude group due to extra load, weak musculature, sedentary lifestyle and reduced glycolytic capacity. Based on the results of the presence study, the obese group demonstrated poor fitness, as evidenced by poor 6MWT performance¹¹.

CONCLUSION

This study shows that there is negative correlation between waist circumference and functional capacity as the p value < 0.00001 in normal healthy individual in age group of 20-30 years.

Limitations

1. Small sample size.
2. Researchers must define percentage of body fat and lean mass so that they will select better population for study.

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