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## Correlation between two dissimilar modes of endurance test

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### Abstract

Now a day's different test are developed to measure cardio respiratory fitness, among them Beep Test, Cooper test, Harvard step test, Queen's college step test, Astrand-Rhyming Cycle Ergometer Test are very common. The researcher want to examine the cardio-respiratory efficiency of the physical education professional students and the relationship between queens college step test score and 12min.run and walk test as a measurement of Cardio-respiratory fitness.

The researcher collects the data of 50 male physical education professional students from Kurukshetra University, Kurukshetra, Haryana and age range from 22-29 years. They perform Queen's college step test and 12 min. run and walk test with an identical condition in same time and same place for collecting data. The correlation result of this study is positive, which means ( $r = 0.36$ ) the subject secure high score in step test was also secure high marks in 12min run and walk test.

**Keywords:** Cardiorespiratory fitness, VO2 max, Endurance.

### Introduction

Cardiorespiratory refers to the ability of the circulatory and respiratory systems to supply oxygen to skeletal muscles during sustained physical activity. Regular exercise makes these systems more efficient by enlarging the heart muscle, enabling more blood to be pumped with each stroke, and increasing the number of small arteries in trained skeletal muscles, which supply more blood to working muscles. Exercise improves the respiratory system by increasing the amount of oxygen that is inhaled and distributed to body tissue.

There are many benefits of cardiorespiratory fitness. It can reduce the risk of heart disease, lung cancer, type 2 diabetes, stroke, and other diseases. Cardiorespiratory fitness helps improve lung and heart condition, and increases feelings of wellbeing.

The American College of Sports Medicine recommends aerobic exercise 3–5 times per week for 30–60 minutes per session, at a moderate intensity, that maintains the heart rate between 65–85% of the maximum heart rate.

The cardiovascular system is responsible for a vast set of adaptations in the body throughout exercise. It must immediately respond to changes in cardiac output, blood flow, and blood pressure. Cardiac output is defined as the product of heart rate and stroke volume which represents the volume of blood being pumped by the heart each minute. Cardiac output increases during physical activity due to an increase in both the heart rate and stroke volume. At the beginning of exercise, the cardiovascular adaptations are very rapid: "Within a second after muscular contraction, there is a withdrawal of vital outflow to the heart, which is followed by an increase in sympathetic stimulation of the heart. This result in an increase in cardiac output to ensure that blood flow to the muscle is matched to the metabolic needs". Both heart rate and stroke volume vary directly with the intensity of the exercise performed and many improvements can be made through continuous training.

Another important issue is the regulation of blood flow during exercise. Blood flow must increase in order to provide the working muscle with more oxygenated blood which can be accomplished through neural and chemical regulation. Blood vessels are under sympathetic tone, therefore the release of noradrenalin and adrenaline will cause vasoconstriction of non-essential tissues such as the liver, intestines, and kidneys, and decrease neurotransmitter release to the active muscles promoting vasodilatation. Also, chemical factors such as a

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decrease in oxygen concentration and an increase in carbon dioxide or lactic acid concentration in the blood promote vasodilatation to increase blood flow. As a result of increased vascular resistance, blood pressure rises throughout exercise and stimulates bar receptors in the carotid arteries and aortic arch. "These pressure receptors are important since they regulate arterial blood pressure around an elevated systemic pressure during exercise"

Although all of the described adaptations in the body to maintain homeostatic balance during exercise are very important, the most essential factor is the involvement of the respiratory system. The respiratory system allows for the proper exchange and transport of gases to and from the lungs while being able to control the ventilation rate through neural and chemical impulses. In addition, the body is able to efficiently use the three energy systems which include the phosphagen system, the glycolytic system, and the oxidative system.

VO<sub>2</sub> max (also maximal oxygen consumption, maximal oxygen uptake, peak oxygen uptake or maximal aerobic capacity) is the maximum rate of oxygen consumption as measured during incremental exercise, most typically on a motorized treadmill. Maximal oxygen consumption reflects the aerobic physical fitness of the individual, and is an important determinant of their endurance capacity during prolonged, sub-maximal exercise. The name is derived from V - volume, O<sub>2</sub> - oxygen, max - maximum.

VO<sub>2</sub> max is expressed either as an absolute rate in (for example) litres of oxygen per minute (L/min) or as a relative rate in (for example) millilitres of oxygen per kilogram of body mass per minute (e.g., mL/(kg·min)). The latter expression is often used to compare the performance of endurance sports athletes. However, VO<sub>2</sub> max generally does not vary linearly with body mass, either among individuals within a species or among species, so comparisons of the performance capacities of individuals or species that differ in body size must be done with appropriate statistical procedures, such as analysis of covariance.

As runners, we all want to increase our endurance, but we're often referring to two different things. The beginning runner wants to go farther--from 2 miles to 4 miles, then to 6. More experienced runners don't see much point in running farther. (Isn't 26.2 miles far enough?) These runners want to improve their speed-endurance--the pace at which they can cover substantial distances.

Fortunately, you can have it both ways. You can follow training plans that build the length of your long runs, and others that improve your speed-endurance.

Using such workouts, thousands of runners have dramatically improved their endurance. Craig Beesley, a beginning runner, extended his longest run from 30 seconds to nearly 3 hours. Doug Underwood, a successful marathoner, wanted to lower his best from 3:50 to 3:30 to qualify for the Boston Marathon. Deena Drossin, the American 10-K and cross-country star is wanted nothing less than to run the marathon faster than a legend, Joan Samuelson.

All three runners achieved their goals. Each used a different method. Which raises the point that exercise physiologist Kris Berg explains in his recent article, "Endurance Training and Performance in Runners," in the journal Sports Medicine. "After decades of studying ways to improve endurance," says Berg. "I'm leaning more than ever toward

the great gestalt of mind-body wisdom, and encouraging runners to do what feels right."

In other words, different strokes are for different folks. We're not all the same. Genetic researchers refer to "high responders" and "low responders." Sometimes we need to take different paths to reach our goals.

**Method and materials**

**Selection of Subjects:** Fifty physical education professional students, age ranging from 22 to 29 years were selected as subjects from Kurukshetra University, Kurukshetra, Haryana. In this study only queen's college step test and 12min. run and walk test were administered for the collection of data in their institutional grounds with identical condition in same time.

**Criterion Measure**

➤ **Queen's College Step Test:** The queen's college step test was performed on a stool of 16.25 inches (or 41.3 cm) height for a total duration of 3 min at the rate of 24 cadence / min which was set by a metronome. After completion of the exercise, the subject was asked to remain standing and the carotid pulse rate was measured from 5 to 20 seconds of the recovery period.

This 15 second pulse rate was converted into beats/min and the following equation was used to predict the maximum oxygen uptake capacity.

Predictive VO<sub>2</sub>max (ml/kg/min)=59.35- (0.1451 x pulse rate in beats per min)

➤ **12min Run and Walk:** The 12 min. Run and Walk Test was administered on an outdoor 400-meter athletic track. Markers are set at after every 25 meter intervals around the track to aid in measuring the completed distance. Students were run for 12 min. with comfortable peace in groups of 10 students and the distance covered by the subject in 12 min. is recorded as score.

**Statistical Procedure:** For the purpose of understanding the relationship between queen's college step test and 12 min. run and walk, Pearson coefficient of correlation statistical technique was used (Excel-2007). The level of significance was set at p<0.05 level.

**Results & Discussion**

The correlation coefficient computed between Queen's college step test with 12 min run and walk test is presented in Table 1.

**Table I:** Relationship of Queen's college step test with 12 min. run & walk test (N=50)

Queen's College Step Test		12 Min. Run and Walk Test		Correlation Co-efficient
Mean	S.D	Mean	S.D	
43.89	5.81	2.13	0.13	0.42

\*Significant at 0.05 level.

Table no. 1 indicates the descriptive statistics i.e. Mean, SD and correlation coefficient (r) of selected variables. The Mean and SD of selected variables is i.e. Queen's college step test (43.89 ± 5.81) and 12 Min run and walk test (2.13 ± 0.13) and Correlation co-efficient is 0.42.

It clearly indicates that there exists a positive significance relationship between Queen's college step test and 12 min. run and walk test.

From the outcomes of the above findings, it may be interpreted that students who secure good marks in queen's college step test was also score good marks in 12 minute run and walk test.

### **Conclusion**

Within the limitation of the present study and on the basis of the findings following conclusions have been drawn:

Significance relationship was observed between Queen's college step test and 12min run and walk test.

There is significant relationship between Queen's college step test and 12min run and walk test therefore, Queen's college step test would be a good alternative in situation where running track is not available or when there is little room for testing.

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