

Cardiovascular Fitness Assessment Using VO2 Max Field Tests

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Introduction

Humans along with many animals require blood flowing in the body to stay alive. The system that regulates blood flow throughout the body is called the cardiovascular system. This system is responsible for the transfer of many important nutrients, oxygen, and minerals all over the body.

The goal of this assignment is to familiarize myself with the estimations of the cardiovascular system. For this purpose we will compare and contrast two different methods of cardiovascular assessment, one is through websites and the second through field testing. After we find the results we will check which one is more accurate and reliable, discuss their pros and cons, and whether any of them should be preferred over the other. (Myers et al., 2015)

VO2max

Every person needs some amount of oxygen to perform his tasks or to do exercise. The maximum amount of oxygen that a person inhales, during exercise is called VO2max. This amount is measured in millimetres of consumed oxygen in one minute per kilogram of the person's weight. VO2 max is an aerobic measure of fitness. The value of VO2max is important for every person, irrespective of whether he regularly exercises or not. The average range of VO2 max in a fit person is between 30 to 60 millimetres per minute per kilogram. As it is a measure of the amount of oxygen inhaled by the person, a higher number is better because it means your body can consume and deliver oxygen better to your body and muscles. A high oxygen consumption means your blood will have a sufficient supply of oxygenated blood which will help you work and exercise better and is a sign of good health. High VO2 max determines the athletic endurance of the person, but it is also affected by certain factors like age, gender, and body weight. (Myers et al., 2017)

Measurement

VO2max can be calculated by two methods, first is the estimate which can be done by formulas, which an estimate of person's average oxygen consumption while the other is the field test which tests the person by actual monitoring. Further, we will discuss both measurement methods and test which one is more accurate and why.

The first test is conducted by the use of two online calculators that estimate VO₂ max. The first test is conducted on a 26-year-old American boy (183 centimetres in height and weighing 73 kilograms) who does 20 minutes of light exercise once a week. The maximum estimated heart rate was found to be 196. The test estimated the VO₂max level of 56 ml/min/kg.



Figure 1. The Fitness Calculator (worldfitnesslevel.org)

The second test that measured VO₂max based on the maximum heart rate (HR_{max}) and resting heart rate (HR_{rest}) found the number to be 49.5 ml/min/kg. Below is the resulting screenshot



Figure 2. VO₂max (brianmac.co.uk)



Figure 3. VO₂max (brianmac.co.uk)

Next, we performed a field test on the person. In this test, the person walked for 1 mile after a 10 min warm-up. After he finished the lap in 13 minutes 20 seconds, the heart rate was found to be 90 bpm. The VO₂ max found after walking field test was 63.79 ml/min/kg. Here is the result screenshot: (Mackenzie, 2018)



Figure 4. VO₂max (brianmac.co.uk)

After this test the running field test and measure how far the subject can run in 12 minutes. The person ran for 2.995 Km. After plugging the data into the calculator, we found these results:



Figure 5. VO₂max (brianmac.co.uk)

The results obtained from the first online test were found to be nearly the same as those obtained from a field test. However, the second online test differs a lot from the field test, and its results were decidedly less than the VO₂max level we calculated from the field test. The cardiovascular assessment of the subject was found to be excellent in the field test.

In practice as a physician, these calculations and field tests can be used to measure the cardiovascular fitness of a person. A person who has a high VO₂max level is considered to be healthy while those who have a lower VO₂max level are the ones who should do something about it. For the people who have a low VO₂max level, they should be recommended to do more exercise (especially running) and maintain their diet plan. Patients having a low VO₂max level should be informed of the

risks involved and how it is harmful to their health. (AS, 2018)

Cardiovascular fitness is linked to the person's blood pressure and risk of heart attack. People who have low cardiovascular health, are more prone to heart attack, blood pressure fluctuations and increased chance of diabetes. This health also determines how much the person is resistant to illness and tiredness and determines the overall efficiency of a person's aerobic ability. Cardiovascular health is increased by exercise. For the people who exercise more and keep themselves active have good cardiovascular health, are more productive in their work efficiency and have more immunity to illness. Cardiovascular health should be carefully monitored and improved at any age in life, and people who have poor health should try to improve their health. Some factors that relate to poor cardiovascular health are less exercise, obesity, less stamina and weak muscles. All these factors can be improved if the person devotes himself to the improvement of his health.

There is a need to modify our lifestyle to maintain our health and fitness. The factors that increase the risk of heart disease should be reduced. Knowing these risks and what factors cause them is necessary to prevent complications in a later age. As physicians, it should be our responsibility to guide people about the importance of cardiovascular health to reduce the number of complications of heart diseases in our society and other adverse effects that low cardiovascular health has on people.

References

AS, E. (2018). World Fitness Level. [Worldfitnesslevel.org](https://www.worldfitnesslevel.org/#/). Retrieved 14 February 2018, from <https://www.worldfitnesslevel.org/#/>

Mackenzie, B. (2018). Rockport Fitness Walking Test. [Brianmac.co.uk](https://www.brianmac.co.uk/rockport.htm). Retrieved 14 February 2018, from <https://www.brianmac.co.uk/rockport.htm>

Myers, J., Kaminsky, L. A., Lima, R., Christle, J. W., Ashley, E., & Arena, R. (2017). A reference equation for normal standards for VO2 max: analysis from the Fitness Registry and the Importance of Exercise National Database (FRIEND registry). *Progress in cardiovascular diseases*, 60(1), 21-29.

Myers, J., McAuley, P., Lavie, C. J., Despres, J. P., Arena, R., & Kokkinos, P. (2015). Physical activity and cardiorespiratory fitness as major markers of cardiovascular risk: their independent and interwoven importance to health status. *Progress in cardiovascular diseases*, 57(4), 306-314.