ABSTRACT:

Predictive analytics is an area of data mining that deals with extracting information from data and using it to predict trends and behavior patterns. Often the unknown event of interest is in the future, but predictive analytics can be applied to any type of unknown whether it be in the past, present or future. Regression models are the mainstay of predictive analytics. The focus lies on establishing a mathematical equation as a model to represent the interactions between the different variables in consideration. This white paper predicted the cardiorespiratory fitness by calculating the VO$_{2\text{max}}$. VO$_{2\text{max}}$ is the golden standard to calculate cardiorespiratory fitness. The method is based on easily getting data gender, maximum heart rate, height, weight and age. This prediction helps to predict the exercise routine of sports person for better performance in their field. Prediction done with the help of Excel data prediction tools using regression analysis.

Keywords: Cardiorespiratory, VO$_{2\text{max}}$, HR$_{\text{max}}$

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.[3]

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.

VO$_{2\text{max}}$ (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.[6] [8] 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$_{2}$ - oxygen, max - maximum. VO$_{2\text{max}}$ 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.
VO 2max levels
“Maximal oxygen uptake (VO2max) is widely accepted as the single best measure of cardiovascular fitness and maximal aerobic power. Absolute values of VO2max are typically 40-60% higher in men than in women.”[5] The average untrained healthy male will have a VO2max of approximately 35–40 mL/(kg·min).[1] The average untrained healthy female will score a VO2max of approximately 27–31 mL/(kg·min).[7] These scores can improve with training and decrease with age, though the degree of trainability also varies very widely: conditioning may double VO2max in some individuals, and will never improve it in others. In one study, 10% of participants showed no benefit after completing a 20-week conditioning program, although the other 90% of the test subjects all showed substantial improvements in fitness to varying degree. [7] [2] In sports where endurance is an important component in performance, such as cycling, rowing, cross-country skiing, swimming and running, world-class athletes typically have high VO2maxima. Elite male runners can consume up to 85 mL/(kg·min), and female elite runners can consume about 77 mL/(kg·min). [2] Five time Tour de France winner Miguel Indurain is reported to have had a VO2max of 88.0 at his peak, while cross-country skier Bjørn Dæhlie measured at 96 mL/(kg·min).

METHOD
The analysis done on the data of 10 people of age group between 25-60. Before the analysis the following data was collected
- Height, weight, age, gender
- maximum heart rate, resting heart rate

Now with the help of maximum and resting heart rate be can calculate VO2max by using the–Sørensen–Overgaard Pedersen.

Now analysis the all other data with VO2max we find that it establish liner relationship with others so applying regression analysis in these data we plot VO2max in x axis and other 4 dependent variable in y axis.
PREDICTION OF CARDIORESPIRATORY FITNESS BY MEASURING VO2MAX

Fig-1: showing relationship among all data

Statistics

ANOVA (analysis of variance) was performed to analysis of different data. The confidence level is kept at 95%.

RESULT

The equation for calculation of VO2max is

\[ 68.12847 + 0.01267x - 0.00858y - 0.49697z - 0.19825k \]

Where x is body weight, y is maxHR, z is age and k is gender.

CONCLUSION

From obtained equation we can predict age, weight or max heart rate for certain level of VO2max. And plan the exercise according to that. We can also add height data and chest size data in this calculation for more accurate planning in exercise techniques and proper routine.

REFERENCES


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