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Correlation between Maximum Oxygen Uptake with Pedalling Positions and Bicycle Speed

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Abstrak

Tujuan penelitian ini adalah untuk mengetahui korelasi antara VO2 Max pedaling posisi duduk dan berdiri terhadap kecepatan. Sampel dalam penelitian ini adalah sepuluh atlet junior DKI Jakarta. Metode penelitian yang digunakan adalah deskriptif. Instrumen yang digunakan pada penelitian ini menggunakan ergocycle untuk mengukur VO2 Max dan untuk mengukur kecepatan menggunakan cyclo. Analisis data menggunakan SPSS versi 20. Hasil analisis dan perhitungan data mengungkapkan bahwa VO2 max dan posisi pedaling memiliki hubungan yang signifikan terhadap kecepatan bersepeda, kemudian posisi pedalling berdiri lebih cepat dibandingkan dengan posisi pedaling duduk. Serta implikasi yang diharapkan dapat membantu dari segi program latihan.

Abstract

The purpose of this study was to investigate the relationship between VO2 Max pedalling positions, including sitting position and standing position toward speed. The samples in this study was ten junior athletes in DKI Jakarta. The research method used descriptive method. The instrument used to measure VO2 Max in this study was ergo cycle, while to track the speed, cyclo was used. Data analysis used SPSS version 20. The results of analysis and calculation of data displayed that VO2 max and the position of pedalling have a significant relationship with speed. Moreover, the position of standing pedalling is faster than the position of sitting pedalling. The results of this study are expected to give beneficial contributions in terms of training programs.

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INTRODUCTION

In the sport of bicycle racing, several facts show the underdevelopment of Indonesian racers' achievements, such as; Tour d 'Singkarak's bicycle race which has been held six times (from 2009 to 2015), Tuor d' East Java has been held seven times (from 2008 to 2015), Tour d 'Ijen Banyuwangi has been held four times (starting in the year 2012 to 2015), Tour d 'Siak has been held three times (from 2013 to 2015) and Tuor d' Indonesia which is a legendary road bike racing event in Indonesia, is the annual calendar of the Great Management of the Indonesian Bicycle Sport Association (PB ISSI). In almost all of these events, racers from foreign countries such as Iran, Australia and Europe won the championship or individual and team events such as the Netherlands, England, Russia, Poland. (PB. ISSI, 2014: 22).

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VO2 max is the key to seeing, understanding and, more importantly managing fitness levels (Bosak et al., N.d.). At a technical level, this illustrates the maximum level at which oxygen can carry into the body properly, carry it to the muscles and use it to produce efficient aerobic energy. When understanding VO2 max values, it is easy to remember that lower VO2 max values represent fitness levels, and higher VO2 max values indicate better performance capacity (Matabuena et al., 2018). Like most aspects related to physical performance, there is a genetic dimension to how efficiently the body uses oxygen and, with an expanded range, VO2 max.

The sport of bicycle racing might seem very easy. But actually there are many techniques that need to be known in order to become a professional bicycle athlete (Aldred, Woodcock, Goodman, & Goodman, 2016). Pedaling a bicycle in a competition also requires special techniques so it needs to be learned well. The first thing to note is to pay attention to the shoes used. Bicycle shoes are very helpful in pedaling faster bikes. Bicycle shoes help make the toes press on the bicycle pedal faster (Turnip, Ratnawati, Tulaar, Yunus, & Kekalih, 2014). In addition, cycling techniques must also be taken into account, especially sitting position in sports, from some trainers stating that sitting and standing position when pedaling a bicycle on an uphill road is very important to discuss because there are some athletes who are comfortable with sitting position and there are some athletes also comfortable in a standing position, so in this case it needs to be carefully examined for continuity and increase knowledge and references to the trainer, so this becomes a problem that must be investigated because pedaling sitting and standing position is a unity to increase speed, especially in the way uphill (Jaakkola et al., 2019).

The branch of bicycle sports is in fact favored by various groups to be the most basic foundation is the physical condition (Cunningham & Cunningham, 2018) then this was revealed by physical trainer satlak prima Suryo Agung in his interview stating that "I see the physical progress of Indonesian bicycle riders who are down at Track numbers is very encouraging. Their motivation is very high to give their best " from the statement it appears that indeed the physical condition is the foundation, but besides that there is also something even more that is an athlete cycling when pedaling.

Pedaling, in this case (Fonda, 2014) states that: "pedaling illustrates the act of transferring the muscle strength of the body" From that recognition, bicycle athletes must have good physical abilities too, the thing that is most considered is the technique of pedaling a bicycle when sitting and standing position it also really needs a good VO2 Max to support when climbing the track (Ong, 2018). Then, the pedaling technique is commonly used by every athlete to help maintain the speed of the bicycle on the incline so that researchers will provide a further picture of the correlation analysis of the

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maximum oxygen volume when the pedaling position is sitting and standing against speed.

METHODS

Design

This study uses a descriptive correlational type of research. According to Sugiyono (2013, p. 13) descriptive research that is, research is conducted to determine the value of an independent variable, either one or more variables (independent) without making comparisons, or connecting with other variables. Correlational research is a study to determine the relationship and the level of relationship between two or more variables without any effort to influence these variables so that there is no manipulation of variables (Fraenkel and Wallen, 2012).

Paticipants

In this study the population studied was DKI Jakarta junior athletes with a total of ten athletes.The sampling of this study using a total sampling technique which means that all populations are sampled.

Instrument

The instrument to measure VO2 Max uses an ergo cycle instrument, the basis of using this instrument is that it has been applied in order to find the effect of acute exercise (once exercise) using ergocycle on blood glucose levels (Ayyuby et al., 2016), then it is also used in the health section (Turnip, Ratnawati, Tulaar, Yunus, & Kekalih, 2014). Therefore from the two studies that have been used become the basis for using this instrument. Speedometer is a land vehicle speed measuring device, which is standard equipment for every vehicle that operates on the road. The speedometer functions so that the driver knows the speed of the vehicle he is running and is used as the main information to control the speed of the area / road so that it is not too slow or too fast, can set travel time and control the speed of the road whose speed is limited. The speedometer goes down with the vehicle speed.

Data Analysis

The purpose of this study was to determine the correlation between VO2 Max and the technique of pedaling the sport of bicycles to speed. Of the ten sampled in the VO2 Max test and bicycle speed with instruments that are already available. Then calculated using SPSS version 20.

RESULT AND DISCUSSION

From the results of the correlation study that was analyzed using several test stages using SPSS version 20. The following is a summary of the results of calculations tha the value of the relationship between VO2 Max and the pedal when standing against speed is known to the correlation coefficient (Correlations) of 0.95 and the Significance value is 0.00 <0.05, it can be concluded that there is a positive and significant relationship between VO2 Max and the pedals when standing against speed.

Table 1. Correlation between Maximum Oxygen Uptake with Pedalling Positions and Bicycle Speed

No	Variabel tes	r	Sig
1	Hub. VO2 Max dengan Kecepatan pedal berdiri	0,95	0,00
2	Hub. VO2 Max dengan Kecepatan pedal duduk	0,75	0,02
3	Hub. RPM dengan Kecepatan	0,78	0,03
4	Hub. RPM dengan Kecepatan pedal berdiri	0,78	0,04
5	Hub. RPM dengan Kecepatan pedal duduk	0,76	0,03

Then for the correlation value or the relationship between VO2 Max and the pedal when sitting to speed known correlation coefficient values (Correlations) of 0.75 and the Significance value is 0.02 <0.05, it can be concluded that there is a positive and significant relationship between VO2 Max with a sitting position pedal to speed.

Furthermore, the correlation value or the relationship between VO2 Max and speed frequency (RPM) is known to be the correlation coefficient (Correlations) of 0.78 and the Significance value is 0.03 <0.05, it can be concluded that there is a positive and significant relationship between VO2 Max with frequency speed (RPM).

Then the correlation value or the relationship between the speed frequency (RPM) with the standing position pedal to the speed of the known correlation

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coefficient (Correlations) of 0.78 and the Significance value is 0.04 <0.05, it can be concluded that there is a positive and significant relationship between the speed frequency (RPM) with the pedal when standing against speed.

And the correlation value or the relationship between the speed frequency (RPM) with the pedal speed when sitting it is known that the correlation coefficient value (Correlations) of 0.78 and the Significance value is 0.03 <0.05, it can be concluded that there is a positive and significant relationship between speed frequency (RPM) with pedal speed when sitting against speed.

From the results of this processing, we know that VO2 Max has an important role to help speed when pedaling stands. Sanderson.JD and Black.A (2003) With the research title The effect of prolonged on pedal forces for speed, in 2003 the sport of bicycle has examined the effect of lengthening the pedal force, and the results of the study are that extending the pedal force has a significant effect on speed besides that, Because physical fitness training is available, the most popular exercise is using a bicycle and then, that cycling ranks among the most popular sports activities (Oosterhuis, 2016). So many people who use these activities.

It turns out that VO2 Max has an influence and correlation on the pedaling position of the indicator in accordance with the hypotesis decision previously described in this case, because VO2 max is the maximum capacity of the body to distribute and use oxygen during intense exercise, which reflects the level of physical fitness of a person, so it is natural to be the basis for measuring the physical condition of several sports included in the bicycle sports. VO2 max is also a determining factor for a person's capacity to do sports activities for a certain period of time and is related to aerobic endurance (Tanaka, et all 2018). So it becomes one of the determinants of one's capacity for the sitting pedal position. Building a foundation of endurance by driving stable speeds with miles traveled on asphalt roads will change some physiological elements in the body (Taylor et al., 2012). Maybe this will do this type of exercise in cycling usually in the range of 65- 80% of the maximum heart rate and must be maintained so that communication is needed for the application of the exercise program. Then the results of research from (Jaakkola et al., 2019) which produced research that: "Elementary school years are important in providing students with experiences in physical activity (PA) which leads to improvements in cardiorespiratory health." So that the ability of VO2 Max has a very important influence, not only for the setting but also very important for school students.

Having a fit body is everyone's dream, especially in the productive age. People who have a fit body will be able to work fulltime with enthusiasm and produce something that maximum Physical fitness is the ability to carry out daily activities without feeling excessive fatigue (Wilke, Fleckenstein, Krause, & Vogt, 2016), and still has reserves of energy to fill leisure time and activities that are of a nature sudden. In addition to having good stamina, a successful racer must develop the ability to control a perfect bicycle because he must ride a bicycle at high speed in a very close(Matabuena et al., 2018) distance to a group of other racers. Individual racers can reach speeds of 110 km / h (68 mph) when descending mountain roads and may reach speeds of 60–80 km / h (37–50 mph) during the final sprint near the finish line.

A bicycle race athlete must have very good stamina, but not only that for bicycle race athletes must be able to control his bicycle with a very fast speed with a distance close to the other racers (Ubago-guisado et al., 2016). The sport of bicycle racing might seem very easy. But actually there are many techniques that need to be known in order to become a professional bicycle racing athlete (Aldred et al., 2016). Pedaling a bicycle in a competition also requires special techniques so it needs to be learned well. Rotations per minute or revolutions per minute (rpm) are units for frequency. Generally, rpm is used to express the speed of rotation (rotation). This RPM is a component of some very important sports in bicycle racing. The length of the race track can be determined by the number of turns or the total time, where the remaining number of laps will be calculated following the progress of the race.

Road race, as know as highway bicycle racing, is often referred to as having a lighter overall weight compared to other bicycle races (Oosterhuis, 2016). Even so it does not mean that road race athletes can perpetuate training and competition. Road race competition prioritizes speed (Mcandrews et al., 2018). Therefore race bike riders must practice at least three things, namely:

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Endurance, strength, and speed. These three things are united by power . And that's really not a light thing.

CONCLUSION

Based on the results of data processing and analysis that has been done, it can be concluded that VO2 Max has a relationship and influence on the ability of the pedals to stand and sit, because the more VO2 Max is good or better the better the technique, then in this study also found that the speed of the paddle speed on the bicycle athlete also affects the ability of the pedals to stand and sit, so the more VO2 max is good and good, the better the ability of the speed frequency and the ability of the pedals in the sitting and standing position, then the results of this study that the pedals when standing more fast compared to the sitting position pedal with a relatively short time, but has a very big effect.

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