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Vo2max Level of Unsika Swimming Athletes

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Abstrak

VO2Max ialah komponen penting dalam meningkatkan prestasi atlet, VO2max merupakan aspek mutlak bagi atlet untuk meningkatkan penampilan dalam prestasinya, dengan memiliki tingkat VO2Max yang tinggi maka targetan dalam latihan akan tercapai dengan optimal. Penelitian ini bertujuan mengetahui tingkat kemampuan maksimal (VO2Max) atlet renang Unsika, metode yang digunakan dalam penelitian ini dengan metode survey dengan pendekatan kuantitatif deskriptif, populasi dalam penelitian ini mahasiswa Klub Renang UNSIKA dengan jumlah 20 orang. Teknik pengambilan sampling menggunakan sampling jenuh (total sampling) dimana semua anggota populasi menjadi anggota sampling dengan jumlah 20 atlet. Instrument pengambilan data dengan tes renang 12 menit, dengan norma yang telah baku dari Cooper swimming test 12 minute. Hasil penelitian menggambarkan tingkat VO2Max atlet renang dengan kategori baik sekali 3 atlet (15%) kategori baik 4 atlet (20%) kategori cukup 3 atlet (15%) kategori Kurang 4 atlet (20%) kategori kurang sekali 6 atlet (30%). kesimpulan dari penelitian ini bahwa tingkat kemampuan vo2max atlet renang unsika pada kategori kurang sekali

Abstract

VO2max is an important component to improve an athlete's performance. VO2max is an absolute aspect for athletes to improve their performance. By having a high level of physical fitness, targets in exercise will be achieved optimally. This study was aimed at determining the level of maximum ability (VO2max) of UNSIKA swimming athletes. It applied a survey method with a quantitative descriptive approach. The population of the study were 20 students from UNSIKA swimming club. The sampling was performed by using saturated sampling (total sampling) where all members of the population become members of the sampling, thus the samples were 20 swimming athletes. The data were collected through a swimming test for 12 minutes with the standardized norm from the 12-minute Cooper swimming test. The results illustrated that the swimming athletes with 'very good' VO2max level category were 3 athletes (15%), the 'good' VO2max level category were 4 athletes (20%), the 'fair' VO2max level category were 3 athletes (15%), the 'poor' VO2max level category were 4 athletes (20%), and the 'very poor' VO2max level category were 6 athletes (30%). The study concludes that the VO2max level of UNSIKA swimming athletes was in the 'very poor' category.

INTRODUCTION

Sports activity is a form of physical activity that has a complex dimension (Pujianto, 2015). Swimming is a cyclical sport, where the movements are carried out continuously, and it does not change. Bioenergy and biomechanical factors play an essential role in influencing the performance process when swimming (Ricardo J. Fernandes & Vilas-Boas, 2012). Swimming is a sport that is very complex in improving the quality of athletes' physical abilities because all the muscles work continuously in swimming. Physical fitness is an individual's physical capability in carrying out activities that require strength, endurance, flexibility (Pratiwi, Setijono, & Fuad, 2018). The ability of maximum physical condition must support the swimming athletes' ability. The physical factor is the essential thing in sporting achievements because technical, strategic, mental factors can improve if they have good physical quality (Zhannisa & Sugiyanto, 2015). The maximum ability level (VO₂Max) in sports is essential, because having a high VO₂max level will be able to compete with the maximally.

If an athlete has an excellent VO₂max level, then he will not experience a significant level of fatigue. If the athlete is experiencing fatigue, it will affect his swimming technique, and it will experience failure (Wiaro, 2013). Swimming achievement will increase if it is supported by an excellent physical condition because physical condition greatly influences athlete achievement (Abdillah, Saichudin, & Sudjana, 2015). The higher the VO₂Max the athlete has, the better the performance will be (Pertiwi & Murbawani, 2012). In swimming, a swimming athlete must have a high level of physical factor, especially the VO₂Max, in order to finish the race. The swimmer's performance achievement during the competition is the result of the exercise he has done (Sperlich et al., 2010). VO₂max level is the maximum ability in the level of oxygen capacity that is absorbed by the cardio system in the exercise process. The endurance aspect is a component of physical ability and an indicator of an athlete during physical activity. VO₂Max is the maximum uptake of oxygen when carrying out sports activities with optimal intensity, this is an indicator of the endurance of the cardiovascular system, and the unit of VO₂Max is ml/kg / min (Ali, 2016). VO₂Max is the maximum amount of oxygen in

millimeters used in one minute per kilogram of body weight (Clara, Putri, & Nisa, 2013). VO₂max test is conducted to find out the maximum ability of heart endurance as a success in the peak of achievement in sports, especially sports that require high endurance, which is perfect and can be utilized by the body through physical exercise during exercise (Purba, 2018).

In the cardiorespiratory system, there are two kinds of endurance, namely aerobic and anaerobic systems. When we do sports activities, generally, the aerobic system is needed to be able to make explosive movements that are needed as energy explosive power. Motion activities that require a lot of oxygen (aerobics) are long-distance running, long-distance bicycle racing, triathlon, marathon, swimming, which are highly needed by aerobic systems in a long period (Aditia, Badruzaman, Paramitha, & Jajat, 2018). The development of aerobic ability or endurance is a significant factor for every swimmer in preparing for the swimmer's race (Zoretic, Grčić-Zubčević, & Zubčić, 2014).

Swimming is a sport that is very popular in the world, swimming itself was brought to Indonesia by the invaders, and it developed in Indonesia with the formation of the swimming management with the name PRSI (All Indonesian Swimming Union) with its chairman, Mr. Purwo Sudarmo. Swimming has many benefits, including making body healthy and fit, as for recreation, personal safety, and as an achievement. Also, swimming with frequency and intensity that is routinely done will increase muscle mass, the endurance of the cardiovascular system, strength, and heart health (Hamsa, Mukhammad, Hartoto, 2015). Swimming has four numbers of swimming styles, including freestyle, backstroke, butterfly, and breaststroke, which have different techniques for each style. Unsika's swimming athletes have mastered the ability of the four styles, but the aerobic ability is still very poor. It can be seen from the results of the observation and interview with Unsika's swimming trainers. Their technical ability is good enough, but the ability of VO₂Max is still very poor. A swimmer must have a high level of VO₂Max ability so that he does not get tired when they are in a swimming race. Unsika's swimming athletes' achievements still cannot compete with other universities, because the majority of Unsika's athletes are not the original swimming athletes. They are Unsika's students who can only

swim properly when they register at the university.

Based on the background of the problem above, the researcher is very interested in investigating Unsika's swimming athletes' VO2Max level with a 12-minute swimming test using Cooper 12 min Swimming Test (Cooper, 2018). Similar research has also been conducted by Aditia (et al., 2018) entitled "Comparison of VO2max Results of Swimming Athletes Using the Williams Swimming Beep Test and Bleep Test". The difference with this study is the use of swimming test norms. Another research is conducted by Huse, Dawan, Patterson Patricia (2000) entitled "The Validity and Reliability of the 12-Minute Swim Test in Male Swimmers Ages 13-17," where the difference is in the norms used and the age of the athletes who are the subjects in his research. The researchers used Cooper 12 min Swimming Test. The problem in this study is fascinating to be investigated because it is rare to examine VO2Max test related to swimming athletes using Cooper 12 min Swimming Test.

METHODS

Based on the results of the interview and observation with Unsika's swimming trainers, the endurance abilities of the swimming athlete gets a particular concern, because they have not been able to complete the training program following the target training. Endurance ability is related to the VO2max level, which is very important in swimming training. Based on VO2Max level, the coaching team will focus on the exercises that lead to the VO2max abilities of athletes.

This research is a quantitative descriptive. Descriptive research is a type of research that is focused on the exposure of events that occur in an area, field, or environment (Suharsimi, 2013) with survey methods. The population in this study is 20 male athletes with total sampling, which means that all populations are sampled (Sugiyono, 2011). The data collection is carried out by conducting tests and measurements. The implementation itself is completed by having the Cooper 12 min Swimming Test.

The data analysis technique is carried out by a 12-minute swimming test. All athletes carry out a swim with a distance of 20 meters for 12 minutes to deter-

mine the level of swimming ability, and then it is entered into the norm of the 12-minute swimming test. The data is processed by simplifying it, and then it is calculated descriptively with the percentages (Asril, 2015).

RESULT AND DISCUSSION

The data presented is processed with statistical data. The table below shows Unsika's Swimming Athletes VO2Max test results.

Table 1. 12-minute swimming test results in male athletes

No	Age 20-29th	Category	f	F (%)
1	≤ 400 Meters	Very Poor	6	30
2	400 - 499 Meters	Poor	4	20
3	500 - 599 Meters	Fair	3	15
4	600 - 699 Meters	Good	4	20
5	≥ 700 Meters	Very Good	3	15
Amount			20	100

Based on table 1, it can be seen that there are 3 athletes categorized at Very Good level of VO2Max (15%), in the Good category, there are 4 athletes (20%), in the sufficient category there are 3 athletes (15%), in the poor category, there are 4 athletes (20%) and in very poor, categories there are 6 athletes (30%).

Based on the results of the study, the VO2Max level of the swimming athletes is in three very poor category (30%), the ability of VO2Max is strongly influenced by several factors including (1) elements of exercise activity, (2) elements of rest, (3) elements of loading in training, (4) elements of lifestyle, (5) elements of the place situation, and (6) elements of nutrition (Pujianto, 2015). This condition is caused by most of Unsika's swimming athletes' swimming abilities are not from the early age. The intensity of the training and training program that causes the athlete's VO2max level is very poor, the ability of the athlete's VO2max level must be increased by the amount of the training intensity and the training programs that are planned and programmed so that the athlete's VO2max level increases and does not easily experience fatigue. The maximum ability must be trained routinely and programmed to produce high VO2max level. The VO2max level is supported by the endurance factors of athletes. Endur-

ance is the foundation of athletes in conducting training activities. Endurance is a process of activity in training for a long time without fatigue (Kurnia & Kushartanti, 2013). Endurance training can be interpreted as a pulmonary endurance system exercise such as running, cross-country long distance running, cycling, aerobics and swimming which is carried out in a relatively long time (Joyner & Coyle, 2008). Endurance training will give a high response to the muscle as a systemically.

Athletes who have the endurance ability will have a high physiological level and there will be a homeostasis on the body, make the ability of the lung become very excessive and the body system will be more normal (Mach & Fuster-Botella, 2016). The key factor of endurance ability lies in the total of hemoglobin (hb-mass) in an athlete because it is the oxygen transport in muscle tissue (Wachsmuth et al., 2013). By having a high level of endurance, it can be ensured that the athlete's VO₂max level is high because the maximum oxygen intake into his body will not fatigue quickly. By having high VO₂max level, athletes will not get tired quickly, especially in sports that take a very long time (Satrio & Winarno, 2019). Swimming is a measurable branch of sport that requires excellent physical abilities so that they will be able to complete their swim according to the race number. The ability to be primed must be supported by the quality of physical conditions, functional anatomy and psychology of the athletes (Ninzar, 2018). These physical conditions include endurance, strength, speed and flexibility that must be trained regularly to improve performance. Factors of good physical condition will affect the ability to swim, especially when athletes compete in numbers of medium and long distance distances, such as the number of 200 meters, 400 meters, 800 meters and 1500 meters where the endurance factor is needed during swimming. A swimming athlete must have a high VO₂max level to be able to swim until finish. What makes the difference between swimming athletes and other athletes is that swimming athletes have higher VO₂max levels (Pajar, Farena, & Kuswiyanto, 2016).

There must be a match between a stable metabolic state of the body and acceleration of swimming during more specific competitions to assess the level of VO₂max at medium and long distances (R J Fernandes, De Jesus, Baldari, Sousa, & Guidetti, 2012). Swimmers' high VO₂max level is influenced by the supply

of oxygen in the body every minute (Rowland et al., 2009). By using a 12-minute swimming test which is a measuring tool to see the athlete's VO₂max level, the athlete's endurance will be seen when they are swimming for a long time, the more distance he takes with 12 minutes, the better the maximum oxygen capacity (VO₂max) level on these athletes. If the amount of distance they travel a little then the level of maximum oxygen capacity (VO₂max) is very poor, and it is likely that the athlete will experience fatigue when following the swimming race.

This study is also supported by previous research. The difference between those research with the author's research is on the subjects and instruments used which is the 12-minutes Cooper Swimming Test instrument (Bayu I Made Andika, 2017). While other studies mention the norm of validation and the reliability of the 3-minute all-out swimming test, the author's research uses standardized assessment norm that is 12-minutes Cooper Swimming Tests (Mitchell, Pyne, Saunders, & Rattray, 2018). Other studies suggest that exercise using high intensity VO₂max will not last long with little time whereas lower exercise will further increase VO₂max levels. This study concerns more on the process of training between high and low intensity exercise on the ability of VO₂max. (Sousa, Vilas-Boas, Fernandes, & Figueiredo, 2017).

Basically all swimmers, both short and medium also long distance swimmers need VO₂max, but the portions differ in each swimmer according to the specialization of the race number taken and the athlete's training portion. Having good VO₂max capabilities will certainly be able to win every swimming competition. The results of this study provide an understanding that the importance of VO₂max levels for athletes to support the achievements of swimming athletes. A very good VO₂max level will support other components of physical condition.

CONCLUSION

Based on the results of the research and data processing, it is found that the VO₂max level of Unsika's swimmers is in the category of very poor. Hopefully, the results of this study can provide positive information for coaches in improving VO₂max athletes.

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