

Analysis of the Maximum Oxygen Volume Level (Vo₂max) of Basketball Referees Pengda Yogyakarta Special Region



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ABSTRACT: A basketball referee is the person responsible for officiating a game. The referee plays a very important role in the outcome of the game. The purpose of this study was to assess the level of oxygen volume. This type of research is descriptive using a quantitative approach. The methods used in this study were surveys and measurement tests. This research was conducted at the Yogyakarta State University Outdoor Basketball Field in December 2023. The data collection technique in this study used the Multistage Fitness Test (MFT). The population in this study were C-A licensed Yogyakarta Special Region Pengda basketball referees totaling 25 referees. The results showed that 3 referees were in the Excellent category with a percentage of 12%, 9 referees in the Fair category with a percentage of 36% and 13 referees in the Poor category with a percentage of 52%. It can be concluded that VO₂max basketball referee Pengda Yogyakarta Special Region has a poor category. Proper and sustainable training is needed so that VO₂max ability is maintained.

KEYWORDS: Analysis, Basketball, Referee, VO₂max

I. INTRODUCTION

Basketball is a big ball game played by two groups / teams of five people, each team dribbling, passing and trying to put the ball into the ring or score as many points as possible (Fatahilah, 2018). Currently basketball is very popular in the world, even almost every country has an official basketball organization. Basketball is widely favored by various groups of people in various regions. The development and progress of basketball in the community in Indonesia is quite rapid (Sugiyati, 2013). This development is also felt in the Special Region of Yogyakarta. Players fight for the ball and score points to the opponent's ring, the players often intersect or body contact (Schiltz, M et al., 2009). Therefore, in basketball games there are often deviations and violations. Every decision-making requires a field adjudicator, namely the referee.

The referee is the person responsible for leading the game. The referee plays a very important role in a game (Sumiyarsono, 2015). In basketball matches, the referee has full protection from the parent of basketball in Indonesia, namely the Indonesian Basketball Association (PERBASI). The referee has the power to make decisions on rule violations committed both inside and outside the boundary line including the floor area near the scorekeeper's table, team benches and the area immediately behind the line (FIBA, 2022). In basketball refereeing, two officiating techniques are known, namely the "Two Person Officiating" and "Three Person Officiating" techniques. To officiate with both refereeing techniques, PERBASI as the highest parent in the game of basketball in Indonesia provides guidelines for doing so, which include the movement of a referee so that all playing fields can be properly supervised by all referees on duty.

Referees can carry out their duties properly if they have a good understanding of match regulations and excellent physical fitness so that the decisions taken are correct and impartial (Rosyadi, 2017). A referee is required to be fast, responsive and precise in making decisions in various situations. Especially situations that require fast mobility such as the eight-second rule and fast break strategy. Therefore, a basketball referee needs good physical fitness in every basketball match he leads.

One part of physical fitness is cardiovascular endurance. Cardiovascular endurance is a strong predictor of health for people of all ages and genders (Benito et al., 2016). Endurance training is influenced and impacts the quality of the cardiovascular, respiratory and circulatory systems. Therefore, the factor that affects aerobic endurance is the maximum ability to meet oxygen consumption which is characterized by VO₂ max. For basketball referees, the better the quality of fitness, the better the

Analysis of the Maximum Oxygen Volume Level (Vo2max) of Basketball Referees Pengda Yogyakarta Special Region

VO2max level of a referee, so that the level of endurance is also good, which in turn a referee has a high level of health and physical fitness. Conversely, if a referee has low endurance, then they will quickly experience fatigue which results in unstable emotions, easily swayed in a situation or atmosphere, lack of concentration and lack of focus in leading the match. VO2max is the maximum amount of oxygen in milliliters, which can be used in one minute per kilogram of body weight (Faiz, 2015).

To meet these endurance demands a referee must have a lot of energy. The demand for energy in large quantities will be produced through an aerobic system that requires oxygen, therefore the high and low endurance of a referee depends on the high and low maximum oxygen capacity or VO2max. Factors that affect VO2max are the physiological functions of the body, exercise or physical activity, food, the physical environment and also genetic or hereditary factors besides that the value of resting oxygen consumption is also influenced by body weight (Sazeli, 2016).

II. METHOD

This type of research is descriptive using a quantitative approach. The methods used in this research are surveys and measurement tests. Descriptive research is research intended to investigate circumstances, conditions or other things that have been mentioned, the results of which are presented in the form of a research report (Arikunto, 2013). The quantitative approach is an approach based on the philosophy of positivism, used to research on certain populations or samples with the aim of testing predetermined hypotheses (Sugiyono, 2017). The survey method was chosen by researchers because the survey method is data collection carried out at this time, to obtain information in the form of characteristics, opinions, and test several hypotheses (Zawawi & Burstiando, 2020).

This research was conducted at the Yogyakarta State University Outdoor Basketball Field in December 2023. The data collection technique in this study used tests. The test was used by researchers to measure VO2max basketball referees Pengda Yogyakarta Special Region. The population in this study of basketball referees Pengda Yogyakarta Special Region licensed C-A amounted to 25 referees. The sample in this study amounted to 25 referees using saturated sampling technique.

Data collection techniques in this study used direct observation techniques. The instrument used in this study used the Multistage Fitness Test (MFT) or bleep test (Fenanlampir & Faruq, 2015). Facilities and tools using a flat and non-slip track, meter, tape (sound tape), cone, stopwatch. Implementation, test participants try to get to the end of the opposite direction to coincide with the "tut" signal. Test takers must place one foot directly behind the start/finish line mark at the end of each run. Test takers should continue running for as long as possible until they are no longer able to adjust to the speed set on the tape. This test is maximal and progressive, meaning that it is quite easy at the beginning with jogging, then increasing and getting faster towards the last moment. Then analyzed based on the score table below:

Table 1. VO2max Ability Standard Norms

No	Score	Category
1	X>55,9	Superior
2	51-55,9	Excellent
3	45,2-50,9	Good
4	38,4-45,1	Fair
5	35-38,3	Poor
6	X<35,0	Very Poor

Source: Ali Miftahul (2016)

III. RESULT AND DISCUSSION

A. Result

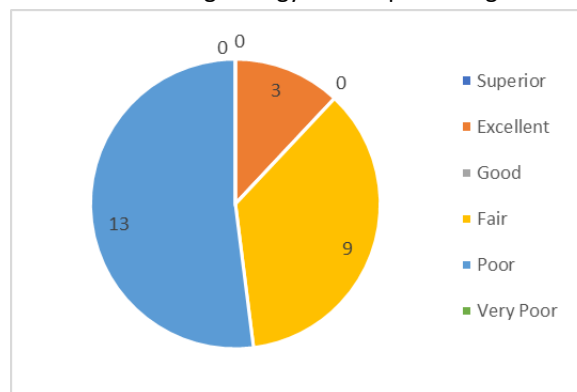
The description of the research data is intended to provide an overview of the results of the sample studied, in this case providing an overview of the VO2max level of the Yogyakarta Special Region Pengda basketball referee. This research was conducted on basketball referees Pengda Yogyakarta Special Region. The purpose of this study was to determine the VO2max level of the Yogyakarta Special Region Pengda basketball referee. Furthermore, in this description, the distribution of the VO2max ability level of the Yogyakarta Special Region Pengda basketball referees of the research respondents according to the VO2max standardization norms with the bleep test is presented as follows:

Analysis of the Maximum Oxygen Volume Level (Vo2max) of Basketball Referees Pengda Yogyakarta Special Region

Table 2. Percentage of VO2max basketball referees Pengda Yogyakarta Special Region.

Category	Score	Frequency	Percentage
Superior	X>55,9	0	0%
Excellent	51-55,9	3	12%
Good	45,2-50,9	0	0%
Fair	38,4-45,1	9	36%
Poor	35-38,3	13	52%
Very Poor	X<35,0	0	0%
Jumlah		25	100%

Graphic 1. VO2max results of basketball referees Pengda Yogyakarta Special Region.



From the table above, it is explained that the results of the analysis of the level of VO2max ability of the Yogyakarta Pengda basketball referee with 25 respondents, obtained the average count (mean) = 53.6 the lowest score obtained was 34.4 and the highest score obtained was 88.2. Based on the table above, it is found that there are 3 referees in the Excellent category with a percentage of 12%, there are 9 referees in the Fair category with a percentage of 36% and there are 13 referees in the Poor category with a percentage of 52%. It can be concluded that VO2max basketball referee Pengda Yogyakarta Special Region has a poor category.

B. Discussion

Based on the results of data processing carried out, it can be concluded that the basketball referee of the Yogyakarta Special Region Pengda has a less category. This is based on the program run by the Yogyakarta Special Region Pengda regarding the physical fitness of basketball referees which is still not optimal. The physical condition that must be trained by basketball referees is cardiovascular endurance both anaerobic and aerobic. Endurance is divided into 2 things, the first aerobic is often called aerobic fitness where in the process of activity O2 is needed because it is carried out over a long period of time such as long distance running and cycling, the second is anaerobic endurance where speed endurance is endurance with a shorter distance (Lumiantuarso, 2013). Aerobic endurance is the ability to perform long-term activities related to O2 and ATP bonds to supply energy (Nusri & Panjaitan, 2019). VO2max can also be called maximal oxygen consumption or maximal oxygen uptake or aerobic capacity. VO2max comes from "V" which means Volume and "O2" means oxygen and Max which means maximum, and can be interpreted as oxygen uptake during maximum excretion of exercise that the body can use during exercise (Tumiwa, 2016).

VO2max is not only a parameter of the level of the body's / physical ability to take oxygen, but also sends it to the working muscles and helps dispose of metabolic waste and not only that VO2max is also one of the factors to support achievement (Salman, 2018). Someone who has good endurance and stamina has a high VO2max value (Chotimah, 2015). So that someone who has poor endurance and stamina will have an impact on a poor VO2Max level. Factors that affect VO2max levels include gender, age, heredity, altitude, exercise and nutrition (Indrayana & Ely, 2019).

Energy system endurance is the ability of the performance of the organs of the human body within a certain period of time. VO2max is the maximum level of oxygen volume used and processed by a person during intensive physical activity and one way to determine VO2max endurance using the MFT test. VO2max is a form of evaluation of the level of a person's physical condition. Data processing of research results shows differences in classification / categories that are quite varied (Nunes, 2019).

Analysis of the Maximum Oxygen Volume Level (Vo2max) of Basketball Referees Pengda Yogyakarta Special Region

Each aspect needs special attention programmatically with a routine training program in order to improve endurance, with the hope that if the basketball referee's endurance is good, the referee will be more focused on the field when leading the match. Then based on the results in the table above, it shows that the average ability of the Yogyakarta Special Region Pengda basketball referee is in the good category. It can be concluded that each referee has a different ability in his endurance ability, the referee will have good endurance if the referee is consistent in physical training.

Endurance training is influenced and impacts the quality of the cardiovascular, respiratory, and circulatory systems. Therefore, the factor that affects aerobic endurance is the maximum ability to meet oxygen consumption which is characterized by VO2 Max. Endurance as the ability of a person to overcome fatigue physically and psychologically (mentally). In another sense, it can also be interpreted that endurance is the ability of the organism (body coordination) to be able to carry out loading as long as possible both statically and dynamically without experiencing a decrease in the quality of its work. Seeing the importance of good cardiovascular endurance that every basketball referee must have, it takes effort to maintain that endurance so that the referee has good fitness quality. A referee is required to be fast, responsive and precise in making decisions in various situations. Especially situations that require fast mobility such as fast attack direction (turn over fast break), therefore a basketball referee needs good physical fitness in every basketball match he leads.

A good physique in sports activities is one of the keys to building confidence (Komarudin, 2015). With a good physique the referee can think calmly not affected by anything and can carry out his duties properly. Referees who do not understand the rules of the game will also result in making decisions that are less precise and seem unobjective. The referee's low level of physical fitness is also one of the factors that can harm one of the competing teams. This results in the referee often being left behind when running to get the best position to determine decision making. The existence of a fit physique, the referee is able to think calmly and is not affected by anything and can carry out his duties optimally (Rosyadi et al., 2017). In addition, if physical fitness decreases, it can result in a lack of trust in the referee's performance and the referee's image becomes bad in the eyes of players, coaches, spectators, even in the eyes of the organizing committee (Rohmana & Kartiko, 2017). FIBA also has a recommended training program to train and maintain good physical fitness. Creating a consistent training program makes changes to the physical fitness of basketball referees for the better. The training program recommended by FIBA to train the physical fitness of basketball referees is a 5 km/day for 5x/week running program, an interval running training program and a leg muscle strengthening training program. Proper and sustainable training is needed so that VO2max ability is maintained. In line with a fit physique, the referee is able to think calmly and is not affected by anything and can carry out his duties optimally (Rosyadi et al., 2017).

IV. CONCLUSIONS

Based on the results of the research that has been done, it is obtained that the VO2max ability of the Yogyakarta Special Region Pengda basketball referee has a poor category. There are 3 referees in the Excellent category with a percentage of 12%, there are 9 referees in the Fair category with a percentage of 36% and there are 13 referees in the Poor category with a percentage of 52%.

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Analysis of the Maximum Oxygen Volume Level (Vo2max) of Basketball Referees Pengda Yogyakarta Special Region

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