



# Cardiovascular Endurance (VO<sub>2</sub>Max) Profile of Gorontalo Football Athletes in Preparation for PON 2024 Aceh - North Sumatra

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**Abstract.** This study was aimed to identify the cardiovascular VO<sub>2</sub>max endurance profile of Gorontalo football athletes in preparation for the 2024 National Sports Week (PON) in Aceh, North Sumatra. The research method used was descriptive quantitative. The research samples were a total of 27 Gorontalo football athletes who were involved in preparations for PON 2024. VO<sub>2</sub>max data was measured using the Multistage Fitness Stage (MFT) test. The results of the research show that the average VO<sub>2</sub>max of Gorontalo football athletes is 45 ml/kg/ minute, which is included in the deficient category. The conclusion of this research was the cardiovascular fitness level of Gorontalo football athletes is still lacking in preparation for PON 2024. Recommendations for further research were to consider other factors that can influence VO<sub>2</sub>max such as diet, physical exercise and genetic factors. The re-search was expected to provide input for coaches and team managers in designing more effective and efficient training programs to increase the cardiovascular endurance of Gorontalo football athletes..

**Keywords:** Profile, Football, National Sports Week.

## 1 Introduction

Physical condition is a crucial aspect for football athletes. According to [1] an athlete's physical condition is an important factor that must be prioritized to improve their performance; as a basic requirement that cannot be ignored or compromised. This is because the sport requires players to have optimal stamina, strength, flexibility and balance to be able to play great.

Good physical condition can influence individual and team performance as a whole [2]. Therefore, it is crucial for football athletes to maintain their physical condition in good and healthy condition. Stamina is one of the key factors in playing football, as it matches last for more than 90 minutes with high intensity [3]. The role of coaches is also important in improving the physical condition of athletes. Therefore, the expertise

of coaches, which includes their knowledge and skills, has a solid meaning in the particular field of sport they coach. It is very important for them to have proficiency not only in the main aspects but also in the smallest details of their field. [4].

In modern football, competition is getting tighter, competitive and intense so that every team tries to achieve their best performance, and good physical condition is one of the main factors that differentiate between teams that are successful and those that are not [5]. As it said, football athletes must make their physical condition as a top priority in their preparation.

VO2max (Volume of Oxygen Maximum) is a great measure in evaluating the physical condition of athletes, including football athletes. It measures the body's ability to use oxygen during intense physical exercise. VO2max is often considered the best indicator of a person's cardiorespiratory performance. According to [6] for football athletes VO2max is an important factor because this game requires high physical endurance over a long period of time. Maximum Oxygen Volume (VO2max) can be measured using the Multistage Fitness Test (MFT). Based on [7] the MFT test form has a number of advantages, including more accurate VO2max data compared to other field tests and do not require a large location, only a 20 meter long field is available.

By identifying each player's VO2max level, coaches can adjust the intensity and duration of training to achieve optimal results according to individual physical needs. VO2max can also be a useful monitoring tool for evaluating an athlete's progress. Through carrying out VO2max tests regularly, athletes and coaches can see whether the training program they are carrying out is effective in improving the athlete's physical condition or not. Apart from that, VO2max can also be a comparison factor between different athletes. In football teams, differences in players' VO2max levels can influence the placement of players on the field and the game strategies used by coaches.

Gorontalo Province Football Athletes have made training preparations before the 2024 National Sports Week (PON) which will be held in Aceh and North Sumatra. The training preparations carried out start from physical, technical and psychological training for athletes when competing. The preparation that is very important for football athletes is the physicality of the players, especially endurance; therefore it is a great way to carry out this research through tests and measurements of athletes' VO2max to see how far Gorontalo football athletes are prepared to face and compete the 2024 PON.

Learning the background, researchers want to know the profile of the physical condition of athletes, specifically the VO2max of Gorontalo Province PON football athletes who will compete in 2024. As for football athletes, good physical condition will support achievements in this sport. Therefore, we can make the region proud in the most prestigious competition in Indonesia which is only held every 4 years. Please note that the first paragraph of a section or subsection is not indented. The first paragraphs that follows a table, figure, equation etc. does not have an indent, either.

## 2 Method

The research methodology chosen for this study was quantitative descriptive, which requires the use of statistical analysis to describe, summarize, and analyze numerical data

[8]. The participants included in this research were all 27 football players who will take part in the Gorontalo PON competition.

This research used was a sampling technique called total sampling, namely selecting the entire population as a sample. In other words, all 27 PON Gorontalo football players were involved as subjects of this research.

The information in this study was collected through the application of the Multistage Fit-ness Test (MFT), a method used to assess maximum oxygen consumption for various purposes. The Multistage Fitness Test (MFT) is a relatively easy but reliable test that in-volves running a distance of 20 meters across 21 levels, each level presenting a different number of laps.

The collected data was analyzed using quantitative descriptive analysis, as describing VO<sub>2</sub>max data based on the maximum level of oxygen consumption. This information will be presented in the form of frequency distributions and tables. Apart from that, the statisti-cal analysis used is descriptive statistics, especially frequency tabulation, which uses a formula to calculate percentages.

### 3 Result

The research data of Gorontalo football athletes was obtained based on the results of the VO<sub>2</sub>max test using the multistage fitness test (MFT) or bleep test which was carried out at the Gorontalo City Sports Hall. The VO<sub>2</sub>Max results of Gorontalo football athletes in pre-paring for PON 2024 Aceh North Sumatra can be displayed in the following table:

Table 1. VO<sub>2</sub>Max Results of Gorontalo Football Athletes Preparation for PON Aceh - North Sumatra

No	Name	VO <sub>2</sub> Max	Category
1.	MFL	51,4	Deficient
2.	MFT	50,2	Deficient
3.	SRM	49,6	Deficient
4.	RM	49,6	Deficient
5.	EN	48,7	Deficient
6.	MTB	48	Deficient
7.	CJW	47,7	Deficient
8.	GNR	47,4	Deficient
9.	SH	47,1	Deficient
10.	RS	47,1	Deficient
11.	AL	47,1	Deficient
12.	RSS	46,8	Deficient
13.	ST	45,8	Deficient

14.	FS	43,9	Deficient
15.	MN	43,6	Deficient
16.	HR	43,3	Deficient
17.	RL	42,9	Deficient
18.	MRL	42,9	Deficient
19.	YA	42,6	Deficient
20.	NL	42,6	Deficient
21.	WD	42,2	Deficient
22.	AR	42,2	Deficient
23.	MAA	42	Deficient
24.	JT	41,8	Deficient
25.	RD	41,5	Deficient
26.	MAN	39,9	Deficient
27.	RA	39,9	Deficient

According to the VO2max power measurements carried out using the MFT test on 27 Gorontalo PON 2024 football players, the average VO2max power was 45. The standard deviation was 3.33 and the highest Vo2max power was 51.4 and the lowest was 39.9. Apart from that, based on table 2, it can be seen that all Gorontalo PON football players are included in the deficient category, as their VO2max value is below 54.

## 4 Discussion

The main goal of this research is to assess the VO2max levels of Gorontalo PON football athletes who are preparing to face the 2024 competition using the Multistage Fitness Test (MFT). A total of 27 athletes were involved in this research. The research results showed that the athletes' overall physical fitness was categorized as poor/deficient. Therefore, it is very crucial for coaches to play an important role in improving athletes' physical fitness in preparation for the match upcoming competition. Given the demanding and high- intensity nature of football, it is vital for athletes to have optimal VO2max levels.

Football is a collaborative sport, with teams usually consisting of 11 players, including a goalkeeper [8]. Like other sports, football requires a strong understanding and mastery of basic techniques in order to excel on the field. It is important for players to continue practicing and perfecting these techniques, allowing them to execute plays quickly and effectively even in high- pressure situations.

An achievement will not be optimal unless there is practice [9]. Training is an activity or training activity that is carried out repeatedly, systematically, with a plan with a load

that increases day by day. To be able to have a high VO<sub>2</sub>max and have good fitness endurance, you need regular exercise.

A person with a high VO<sub>2</sub>max has excellent endurance and overall fitness levels. In finding out the VO<sub>2</sub>max, we can undergo special tests. Cardiorespiratory endurance refers to the heart's capacity to deliver oxygen to the body efficiently, preventing fatigue. The heart plays an important role in the distribution of oxygen throughout the circulatory system in the body.

Based on the data collected, it appears that the majority of Gorontalo PON footballers have a VO<sub>2</sub>max that is in the low category, even if adjusted for their ability level. All of 27 Gorontalo PON football athletes, all were in the low category or below 54. This finding shows the need for further improvement in the VO<sub>2</sub>max capacity of Gorontalo PON athletes, especially considering that there are only a few months left until the PON event takes place.

Cardiorespiratory endurance is a crucial component of physical fitness for athletes, so it requires consistent daily training to maintain it. Athletes can increase their VO<sub>2</sub>max through structured physical training, which encourages anatomical improvements that ultimately increase their endurance levels. This dedication to training can be seen from the extraordinary VO<sub>2</sub>max abilities shown by athletes from Gorontalo who will take part in the PON competition.

## 5 Conclusion

The conclusion of this research was the cardiovascular fitness level of Gorontalo football athletes is still lacking in preparation for PON 2024. Recommendations for further research were to consider other factors that can influence VO<sub>2</sub>max such as diet, physical exercise and genetic factors. The research was expected to provide input for coaches and team managers in designing more effective and efficient training programs to increase the cardiovascular endurance of Gorontalo football athletes. more inclusive and responsive to the needs of all students, including those with special needs

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