

PROFILE OF PHYSICAL FITNESS IN STUDENT FOOTBALL ATHLETES IN SRIWIJAYA STATE SPORTS SCHOOL SOUTH SUMATRA

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<i>Keywords:</i>	ABSTRACT
<i>Durability;</i>	Fit physical
<i>VO2Max;</i>	FVC;
<i>Physical Fitness</i>	Fit physical condition is needed in every sport, especially in soccer which is known to be one of the dynamic sports with dominant movements using anaerobic energy, and also aerobic energy to be able to last throughout the game for a long duration. Every player is required to have excellent physical fitness which is certainly supported by maximum aerobic capacity. For an athlete, aerobic capacity is mandatory to be increased as much as possible, especially in adolescence, because at this time it can contribute to an increase in aerobic capacity of up to 30-35% compared to adults and the elderly. The purpose of this study was to determine the profile of the physical fitness level of athlete students through VO2Max and Forced Vital Capacity (FVC) lung parameters in football athlete students at Sriwijaya State Sports School. This type of research is a descriptive analysis and data collection is carried out by laboratory using a treadmill device with the Bruce method and a spirometry. The subjects amounted to 33 male students from the sport of football. The results of the data analysis showed that the majority of athlete students had a fitness level with less category (96.9%) and very less category (3.1%), the predicted value of Forced Lung Vital Capacity with normal category was 66.7% and the remaining 33.3% in the category below normal. The average count (mean) of pulmonary FVC value is = 2.86 liters. It can be concluded that the level of physical fitness is still low, for that it is necessary to increase the maximum aerobic capacity and lung capacity of athlete students as much as possible through an intense and systematic training program.

INTRODUCTION

Physical quality plays an important role for the achievement of an achievement for athletes, because good physical condition will support the abilities of others, for that every athlete is required to appear fit and have a very good level of physical freshness, especially for athletes with sports that require excellent stamina^{1,2} Each sport demands physical fitness and physical condition components that vary according to the characteristics of the sport. Football is a dynamic sport that requires excellent physical condition with high endurance (Habibie et al., 2023). The most dominant energy system characteristic used in this sport is the anaerobic energy System the duration of the game lasts, needs to be supported by an aerobic energy system (Susanto & Sipayung, 2023). This aerobic energy system requires a lot of oxygen continuously which is channeled to muscle fibers (Porter & Gamperl, 2023). The maximum speed of energy use through an aerobic system that requires oxygen, is limited by the maximum speed of the cardiorespiratory system (Zuo et al., 2023). Cardiorespiratory endurance is the most important capital in soccer, so that every player does not feel significant fatigue when competing (Zuo et al., 2023). which will affect the achievement of achievements (Pérez-Martínez et al., 2023).

Someone who has good physical fitness, is a reflection of the cardiopulmonary fitness owned (Thielen et al., 2023). An indicator often used to assess cardiopulmonary fitness is VO₂Max. The greater a person's VO₂MAX, the greater the ability to run heavy workloads, and the faster he will recover physical fitness after heavy work.^{5,6} The main purpose of VO₂MAX is to increase the working capacity of the heart in addition to improving the work of the lungs and circulatory system and improving physical fitness (Ridwan et al., 2023). Good lungs that are accustomed and trained in exercise, will be able to increase blood flow which then causes oxygen to diffuse into the pulmonary capillaries with a larger or maximum volume, so as to increase lung capacity and function, but if there is impaired lung function, it can affect the ability to exercise.⁷

In general, all physical activities that require physical activity require VO₂MAX. VO₂MAX is the athlete's body's ability to cope with fatigue from long-term physical activity (Ridwan et al., 2023). Although there are still people who think that VO₂MAX is not so important, physiologists believe that VO₂V Max is very important for improving one's physical fitness. Because at high VO₂Max levels, the quality of complex sports activities such as running, jumping, and active movements will be maintained for a long time.⁸

There are several sports vocational schools in Indonesia, one of which is the Sriwijaya State Sports School, belonging to the province of South Sumatra (Hidayat et al., 2023). Sriwijaya State Sports School is one of the schools with a junior high school education managed by the Education Office of South Sumatra Province in order to accelerate the improvement of sports achievement for students. Sriwijaya State Sports School is the only sports school in South Sumatra that implements general education and sports specialty education to develop potential talents and

skills sports in order to excel in their respective branches (Usra, 2013). Currently, there are a total of 14 sports fostered at Sriwijaya State Sports School including football ranging from the age of 13-18 years. Exercise in adolescence can result in an increase in aerobic fitness by 30-35% while in adults it can increase by 20-25% (Min et al., 2019), and in the elderly about 18%.⁹

For soccer athletes, endurance needs special attention, in order to achieve the highest fitness and maximum skill of each player (Ferreira et al., 2024). During the survey on the field, it was found that football students looked easily breathless during the game, and exhausted during physical tests (Reitz & Chambers, 2023). The participation of Sriwijaya State Sports School football students is classified as active in participating in regional and national tournaments, but in general the achievements achieved in the last 4 years have not been maximized, students who take part in the selection to take part in tournaments both held by provincial and regional committees, are still limited to those who meet the requirements and who pass the selection.

In July 2023, the Central PSSI issued a notification letter regarding the selection requirements for U-17 National Team players for FIFA competitions, one of these criteria is the minimum VO₂MAX score requirement that players must have, namely for *Defender* (defender) players 56-60, *Midfielder* (*midfielder*) players 63-67, and *Attacker* players (forward) 57-61. With this minimum criterion, it can be a reference standard for players and also reference material for coaches to achieve these achievement targets (Zuber, 2023). For this reason, it is necessary to know how the physical fitness profile of the Sriwijaya State Sports School football team which will also be prepared to take part in various tournaments such as POPNAS, PORPROV, and SURATIN CUP in 2023.

RESEARCH METHODOLOGY

The purpose of this study was to determine the picture of physical fitness level by measuring the cardiopulmonary endurance ability of football students at Sriwijaya State Sports School, South Sumatra (Iyakrus et al., n.d.). The parameters to be measured to represent cardiopulmonary fitness are maximal oxygen capacity (VO₂Max and forced vital capacity (KVP) (Hayati et al., 2020). The research instrument used to obtain VO₂Max data is a treadmill test with the Bruce method, then the METs value obtained from the treadmill test is converted into mlO₂ / kgbb / minute units so that it can be classified into the level of physical fitness, spirometry examination is carried out to measure the vital capacity of the lungs. Measurement of cardiopulmonary fitness with a treadmill test is believed to be more accurate than other field tests because it has a high level of confidence in the measurement of cardiopulmonary fitness parameters because during testing heart performance during heavy physical activity, the installed electrocardiogram (ECG) device can directly monitor the heart's electrical rhythm, target heart rate, and heart rate Maximum, also blood pressure is monitored simultaneously at one time. Lung function examination with spirometry is also carried out to support the results of the assessment of students' physical fitness.

The target subjects in this study were 33 football students (males) at the Sriwijaya State

Sports School. The data collection of this study was carried out on July 10-22, 2023. Data analysis techniques use quantitative descriptive analysis expressed in percentage form

RESULTS AND DISCUSSIONS

RESULTS

1. Distribution Based on Age

Tabel.1 Frequency Distribution Based on Age of Football Students at Sriwijaya State Sports School

No	Age	Frequency	Percent
1.	11-14 year	10	30,3
2.	15-19 year	23	69,7
		33	100

Table.1 illustrates the ages of football students grouped into two age groups, namely the age group 11-14 years and the age group 15-19 years. From the results of the analysis, it was found that the overall research subjects were more dominated in the category of the age group of 15-19 years, namely 23 people (69.7%) and for the age group of 11-14 years as many as 10 people (30.3%).

2. Distribution Based on Body Weight

Tabel.2 Frequency Distribution Based on Body Weight of Football Students at Sriwijaya Sports

No	Body Weight(kg)	Frequency	Percent
1.	31-40	3	9,1
2.	41-50	11	33,3
3.	51-60	10	30,3
4.	61-70	8	24,3
5.	71-80	0	0
6.	81-90	1	3,0
		33	100

Table.2 illustrates the body weight of Sriwijaya State Sports School football students divided into 6 groups. From the results of the analysis, it was found that from 33 research subjects obtained more in the group weighing 41-50 kilograms (33.3%), and the rest of the group weighing 51-60 kilograms (30.3%), the group weighing 61-70 kilograms (24.3%), the group weighing 31-40 (9.1%) and the group weighing 81-90 (3.0%).

3. Distribution Based on Body Height

Table.3 Frequency Distribution Based on Height of Football Students at the Sriwijaya State Sports School

No	Height(cm)	Frequency	Percent
1.	144-149	1	3,0
2.	150-155	2	6,1
3.	156-161	6	18,2
4.	162-167	12	36,4

5.	168-173	9	27,3
6.	174-179	3	9,0
		33	100

Table.3 illustrates the height of football students group into 6 groups. From the results of the analysis, it was obtained that of the 33 research subjects, they were more dominant in the group with a height of 162-167 cm (36.4%), then with a height group of 168- 173 cm (27.3%), a height group of 156-161 cm (18.2%), a height group of 174-179 cm (9.0%).

4. Distribution Based on Age Nutritional Status

Table.4 Frequency Distribution Based on Age Nutritional Status (BMI/U 5-18 years) Football Students at Sriwijaya State Sports School

Nutritional Status	Frequency (n)	Percentage (%)
Severely thinness	0	0,0
Malnutrition (<i>thinness</i>)	3	9,1
Good Nutrition (normal)	29	87,9
More Nutrition (<i>overweight</i>)	1	3,0
Obesity (<i>obese</i>)	0	0,0
	33	100

Table.4 shows that most of the study subjects had nutritional status with the Good Nutrition (normal) category of 78.8%, and the Less Nutrition category (*thinness*) of 9.1%. Overweight category by 3.0%.

5. Distribution Based on Percentage (%) Adequacy of Macro Nutrients

Table.5 Frequency Distribution Based on Percentage (%) Adequacy of Macro Nutrients in Football Students at Sriwijaya State Sports School

	Category	Frequency(n)	Percentage(%)
Energy	Less (< 80%)	21	63,6
	Fair (80-110%)	10	30,3
	More (>110%)	2	6,1
		33	100
Protein	Less (< 80%)	14	42,4
	Fair (80-110%)	12	36,4
	More (>110%)	7	21,2
		33	100
Fat	Less (< 80%)	21	63,6
	Fair (80-110%)	8	24,2
	More (>110%)	4	12,1

		33	100
Carbohydrate	Less (< 80%)	19	57,6
	Fair (80-110%)	10	30,3
	More (>110%)	4	12,1
		33	100

From Table.5 shows the percentage of macronutrient adequacy in student athletes based on the Daily Value (RDA 2019), which is as follows for Energy most students are in the less category (63.6%), Protein is in the less category (42.4%), Fat is mostly in the less category (63.6%), and for Carbohydrates is in the less category (57.6%).

Description of Research Data

1. Metabolic Equivalents (METs)

Table.6 Values Metabolic Equivalents (METs) On Treadmill Test With Bruce Method In Football Students at the Sriwijaya State Sports School

	N	Mean	Minimum	Maximum	Std. Deviation
METs	33	11,7	5,8	12,3	1,08

From Table.6 illustrates the results of the analysis of METs scores students obtained from treadmill tests have an average count (mean) = 11.7 METs, the lowest value of 5.8 METs, and the highest value of 12.3 METs. To get an idea of the level of physical fitness of students, the METs value will first be converted into ml/kgBB/minute (multiplied by 3.5) so that the estimated VO2MAX can be known.

2. VO₂Maximal (VO₂Max)

Table.7 Estimated VO₂ Maximal Values in football student athletes

	N	Mean	Minimum	Maximum	Std.Deviation
VO₂Max (ml/kg/minute)	33	41,06	20,30	43,05	3,79

From table.7 illustrates the results of the analysis of VO2Max values with an average count (mean) = 41.06 ml / kg bb / minute, a minimum value of 20.30 and a maximum VO2Max value of 43.0. Furthermore, the calculation of the VO2Max score of each student is included in the Bruce norm category so that the percentage of physical fitness level of each student can be known.

3. Classification Physical Fitness

Table 8. Classification and Percentage Physical Fitness Level Based on VO₂Max Score In Football Students at the Sriwijaya State Sports School

VO ₂ Max	Classification fitness	Physical	Frequency(n)	Percentage(%)
> 55,9	<i>Very good (excellent),</i>		0	0,0
51 - 55,9	<i>Good (good),</i>		0	0,0

45,2 - 50,9	Enough (<i>average</i>),	0	0,0
38,4 - 45,1	Less (<i>Fair</i>)	32	96,9
35 - 38,3	Bad (<i>Poor</i>)	0	0,0
< 35,0	Very bad (<i>Very Poor</i>)	1	3,1
		33	100

From the table.8 it can be seen that the majority even almost all students have a level of physical fitness in the *Less (Fair)* category, which is as many as 32 people (96.9%), and 1 person in the *Very Poor* or very poor category (3.1%).

4. Forced Vital Capacity (FVC)

Table.9 Lung Forced Vital Capacity (FVC) Based on Volume Values In Football Studentsat Sriwijaya State Sports School

	N	Mean	Minimum	Maximum	Std.Deviation
FVC Actual					
- Vol (liter)	33	2,86	1,46	3,82	0,60

Table.9 illustrates the calculated average of the volume of Forced Vital Capacity in student athletes is 2.86 liters, with the lowest value being 1.46 liters and the highest value being 3.82 liters. For the predicted value of Forced Vital Capacity in students, football athletes have a calculated average (mean) = 81.4% with the lowest value of 60% and the highest value of 103%.

DISCUSSION

The research conducted at the Sriwijaya State Sports School, South Sumatra, isto identify the current physical condition of students, especially at the level of physical fitness through measurements of VO₂ Max and FVC also research data is used as screening in understanding the advantages and disadvantages of each student. The screening results are also used as basic data to compile the next training program, for the Sriwijaya State Sports School football team in South Sumatra.

Based on the results of the description and percentage analysis of all research subjects, there are several explanations as follows:

1. Based on descriptive analysis of VO₂MAX data which was then classified into fitness levels, it was found that the majority of SONS football athlete students had physical fitness levels in the Less category (96.9%), and 1 person in the very poor category (3.1%). With an average VO₂MAX = 41.06. This fitness level is still relatively low and can be maximally improved by running an intense and continuous exercise program that focuses on endurance. The results of interviews with trainers revealed that they had never run an intensive cardiopulmonary endurance program, endurance training was still ordinary physical exercise such as games, sit ups, push ups, running, and not continuously.

2. Based on the analysis of the description on the indigo, the prediction of Lung Forced Vital Capacity showed an average count (mean) = 81.6%. This shows that the average student athlete as a Forced Vital Capacity in the normal category (>80%). Although there are some

students who have grades that are less than normal grades (60-79%) but within the limits of mild impairment. This indicates that there is a malfunction of lung volume development at the time of breathing or inspiration. As for the volume of Forced Vital Capacity (FVC) in football athlete students has an average count (mean) = 2.86 Liters

The vital capacity of the lungs is the maximum amount of air that can be expelled from the lungs, after the air is filled to the maximum. This capacity includes inspiratory reserve volumes, tidal volumes and expiratory reserves.^{10,11}

From the average results of the calculation (mean) of forced vital capacity obtained in all research subjects amounted to 2.86 liters. Then the value is still below the normal value. This can be improved with intense exercise that also focuses on lung development exercises. Also other factors such as staying away from cigarette smoke and other air pollutants stretching chest muscles and breathing. Drink lots of water, and also make sure the air circulation in the room is good enough. The high and low VO₂Max a person is also influenced by the state of the vital organs of the lungs as organs that provide oxygen, and the quality of one's blood (hemoglobin), so that a person's endurance will also not be separated from good lung function¹².

CONCLUSION

Based on the results of research and data processing with descriptive analysis, it is concluded as follows: Most football students at SONS South Sumatra have maximum oxygen capacity (VO₂Max) with less category (96.9%) and very poor category (3.1%). Most of the soccer students at SONS South Sumatra had an average normal Lung Forced Vital Capacity score or 66.7% of all students and the remaining 33.3% in the mild restriction category.

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