

Effect of Small Sided Games Training on Anaerobic Endurance and Fatigue Index in U-17 Soccer Athletes



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ABSTRACT: Coaches in implementing training programs in an effort to improve the physical condition of their athletes have been done in various ways, one of which is by optimizing anaerobic endurance and fatigue that occurs in athletes. The purpose of this study was to analyze the effect of small-sided games training on anaerobic endurance and fatigue index of U-17 soccer players. This research uses a quasi-experimental approach. The method used the experimental method one group pre-test post-test, the sample design used amounted to 30, with sampling techniques using purposive sampling and data analysis techniques for hypothesis testing using paired sample t test and two-track ANOVA test. This found that there was a significant influence on Small Sided Games training on Anaerobic Endurance and Fatigue Index in U-17 Football Athletes with data on the results of the Small Sided Games training method there was an influence on increasing anaerobic endurance tcount $9.595 \geq t_{table} 2.144$ and decreasing fatigue index tcount $5.241 \geq t_{table} 2.144$. So it can be concluded that the Small Side Games training method has an influence on increasing anaerobic endurance and decreasing fatigue index in U-17 soccer players. However, from the Small Sided Games exercise method in addition to the influence is also very effective for increasing anaerobic endurance and endurance (decreasing fatigue index) more using Small Sided Games exercises.

KEYWORDS: Small Sided Games, Durability, Anaerobik, Fatigue Index, Athlete.

I. INTRODUCTION

Technical, physical and mental aspects become the most serious and important challenges to achieve victory [1]. Especially in a football match. This is because, the performance of an athlete is determined by physical condition, technique, tactics, and mental [2]. Thus conveyed by Bompá & Buzzichelli (2015) that physical condition plays a fundamental role that must be built and developed in football athletes. Therefore, the preparation of technical and motor skills of players and mentality needs to be well prepared [3]. As in the case of football. Careful preparation can determine the results that will be obtained when competing. Football players who have good physical condition, will be more efficient in carrying out tactics in a match. Conversely, if the preparation of physical condition is not perfect, technical, tactical and mental abilities will be affected so that the performance is less than optimal. Thus, physical condition is an important element and becomes the basis / foundation in the development of techniques, tactics, strategies and mental development [4].

Football is a sport of achievement played by 2 teams, each consisting of 11 players and several reserve players. The game of soccer aims to control the ball and put the ball into the opponent's goal as much as possible and try to keep the goal from conceding the ball. Strategies to achieve these goals, then in the sport of football requires practice. Exercise is to give physical emphasis regularly, systematically, and continuously in such a way as to improve the ability to perform work and improve physical fitness or physical ability [5]. The ranking of sports achievements in Indonesia, especially football, is often a concern because it has decreased from year to year. Both in the youth age group and in the senior team. Currently the Indonesian football team is ranked 162nd according to the Federation International Football Association (FIFA). Indonesia's ranking is still below other Asian countries [6]. The decline in the achievements of the Indonesian football national team occurred due to many factors, ranging from coaching that was still not optimal, to the factors of Indonesian football management managed by PSSI (Indonesian Football Association). The factors that influence the decline in the performance of the Indonesian national team must begin to be considered thoroughly, both from the manager and also the players in the national team. One strategy that can be done to improve the achievements of Indonesian football is that athletes play well, according to the direction of the coach, and the training program of the Indonesian national team is well implemented. According to [7] High achievement can only be achieved by training that has been systematically planned, carried out continuously, and under the supervision and professional relationship of the coach.

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According to [8] exercise is to give physical emphasis regularly, systematically, and continuously in such a way as to improve the ability to perform work and improve physical fitness or physical ability. Football is a high-intensity sport where each player must always be ready in match conditions for 2 x 45 minutes with a break between innings of only 15 minutes, so a player must have good physical condition. Football is a sport consisting of technique, tactics, physical and mental, to achieve good performance a player must have these components [9]. In line with other writings that state that, technical, physical and mental aspects become the most serious and important challenges to achieve success [10]. Thus conveyed by Bompá & Buzzichelli (2015) that physical condition plays a fundamental role that must be built and developed in football athletes.

Physical condition is a necessary requirement in an effort to improve athlete performance, it can even be said to be a basic need that cannot be delayed or bargained again. Physical condition is a whole of components that cannot be separated just like that, both improvement and maintenance [11]. Physical condition is a requirement that must be owned by an athlete in improving and developing optimal sports performance, so that all physical conditions must be developed and improved according to the characteristics, characteristics, and needs of each sport [12]. Better physical condition has many advantages including athletes are able and easy to learn new skills that are relatively difficult, not easily tired in participating in training and matches, training programs can be completed without many obstacles, recovery time is faster and can complete relatively strenuous exercises. Given that, the importance of athletes having good physical condition, physical condition training is the main program that must be given in athlete coaching, because it helps athletes to achieve achievements in sports of interest and reduces the risk of injury. In addition, physical condition training is very influential on increasing the confidence of an athlete.

A modern soccer player must demonstrate a high level of endurance, speed, strength and coordination skills. A practical measure of a player's endurance skill evaluation is the length of distance traveled during the game. Elite footballers cover an average total distance of 10–12 km at 80–90% maximum heart rate, perform 150–250 intense activities such as acceleration/deceleration, and change direction with short recovery [12]. The ability to jump, accelerate, and sprint makes an important contribution to the performance potential of a soccer player. About 96% of sprints are shorter than 30 m, and 49% cover only 10 m. Thus, performance at a distance of 10 m or less, and the speed achieved during the first move are considered key indicators of a player's potential [13]. Biomotor components of a football player's physical condition include strength, explosive power, speed, agility, coordination, balance, endurance, flexibility. According to [14] states that the components and classifications of physical abilities in football (men) are (1) strength, (2) muscular endurance, (3) speed, (4) agility, (5) flexibility, (6) power and, (7) cardiopulmonary endurance.

Muscular endurance is the ability of muscles to deal with resistant loads from inside or outside the body so that muscles are able to develop and adapt to fight these resistances. Cardiovascular endurance is divided into aerobic and anaerobic endurance. Aerobic endurance is related to a person's ability to perform activities for a long duration and avoid the opportunity for fatigue. While anaerobic endurance is related to the body's explosive ability to move quickly and repeatedly with interludes of rest periods. A soccer player must have good endurance so as not to easily experience fatigue. This requires players to have excellent aerobic and anaerobic endurance capacity to complete training programs as well as during matches. Anaerobic endurance is an important component in soccer players. According to [15] a person with good anaerobic capacity, will have an efficient heart, effective lungs, good blood circulation, so that the muscles are able to work continuously without excessive fatigue. Good anaerobic endurance is a valuable asset for football players.

Fatigue is a condition in the body that shows a decreased physical and psychological state which causes a decrease in endurance when doing exercise and work activities. According to [16] fatigue is a protective mechanism of the body so that the body avoids further damage so that recovery occurs after rest. Fatigue affects the physiology and psychology of an athlete, which can reduce muscle strength due to the accumulation of lactic acid left over from burning energy. Even fatigue has a negative impact on the body such as discomfort, aches, aches and stiffness on the body, and even affects the motivation, anxiety and concentration of an athlete in training and in matches.

FC UNY Academy is one of the football schools in Yogyakarta. Established in 2017, FC UNY academy is under the same management with UKM Sepak UNY. FC UNY Academy has two class groups, namely U-15 years and U-17 years. FC UNY Academy has participated in several tournaments, both in the Yogyakarta region and outside Yogyakarta. Several tournaments and matches have been participated in, but the FC UNY Academy has not received maximum results. Based on field observations made by the author and coaches, FC UNY Academy suffered defeats in several tournaments, such as in the Soeratin Cup caused by several factors, including physical endurance that was less marked by decreased movement without the ball and teamwork in the second half, easy loss of concentration, and immature training techniques.

The author observes that during the match many players are easily tired, the tactical training that has been given cannot be applied properly during the match, the players still often lose possession of the ball, are not swift in receiving the opponent's attack and often make wrong decisions. This is because, to get high football sports achievements, a team must be formed consisting of

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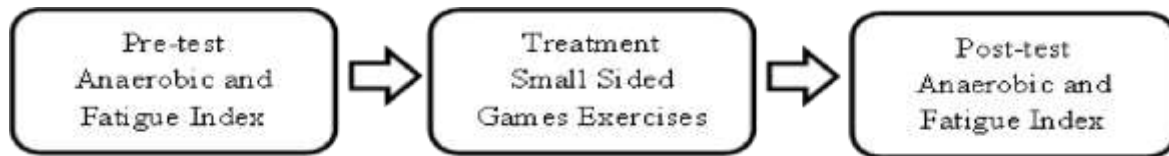
coaches who are able to provide qualified playing and attacking tactics in facing enemies, players who have good aerobic and anaerobic endurance capacity, are able to cooperate, communicate, and have high endurance.

Based on some of the descriptions above, it shows that SSG is a form of exercise that is relevant to the situation in the game. The modified form of training from the number of players, the size of the field and the time of execution can improve the technique, tactics and physique of players. In addition, players are required to always be active in a narrower area so that players have to make decisions faster and execute them.

II. METHOD

The approach used in this writing is a quasi-experimental approach. This writing uses One Groups pre-test post-test design. Pseudo-experimental writing generally involves two classes, namely the experimental class and the control class, the experimental class is the class that gets the new treatment being investigated. The following is a research design design can be described in the table below.

Table 1. Research Design Design



The population in this study was FC UNY U-17 academy players totaling 53 players who were then taken based on purposive sampling techniques. So from the results of purposive sampling, researchers found as many as 30 samples. Furthermore, the instruments used in this writing are the 300-meter Running test and RAST (Runing Anaerobic Sprint Test) to measure Anaerobic Endurance and using the running-based anaerobic sprint test (RAST) the subject completes 6 sets with a distance of about 35 meters with a rest period of 10 seconds between each sprint to measure the Fatigue Index in athletes. Where the data collection technique uses pretest and post test results, and the data analysis technique in this study uses SPSS 20, namely by using twoway ANAVA (two-way ANAVA) at the significance level of $\alpha = 0.05$. Before arriving at the utilization of two-way ANAVA (two-way ANAVA), it is necessary to carry out prerequisite tests, which include: (1) normality tests and (2) homogeneity tests. As well as Hypothesis test using two-way ANAVA (two-way ANAVA).

III. RESULT

The results of the study on the effect of small sided games training method on anaerobic endurance and fatigue index of U17 football players. Found the results below:

Table 2. Anaerobic Endurance Data Statistics with Small Sided Games Exercise Method

Respondents	Anaerobic Endurance Group 1 (Pretest)	Anaerobic Endurance Group 1 (Posttest)
<i>Mean</i>	49,83	47,93
<i>Median</i>	48,49	47,15
<i>Mode</i>	47.76	45.66
<i>Std. Deviation</i>	2,47	2,32
<i>Minimum</i>	47,76	45,66
<i>Maximum</i>	54,99	52,85
<i>Sum</i>	747,51	719,00

Table 3. Anaerobic Endurance Data with Small Sided Games Exercise Method

Category	Interval	Pretest		Posttest	
		Frequency	Percentage	Frequency	Percentage
Very good	31.80 – 38.95	0	0	0	0
Good	38.98 – 44.59	0	0	0	0
Keep	44.60 – 49.89	9	60	12	80
Less	49.90 – 55.29	6	40	3	20
Very less	55.30 – 60.59	0	0	0	0
Sum		15	100	15	100

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Based on the results of the writing above, the average score during the pretest was 49.83, and the average posttest was 47.93. To determine the magnitude of the increase in anaerobic endurance with the small sided games exercise method in this writing using the percentage increase formula.

$$\text{Peningkatan Persentase} = \frac{1,90}{49,83} \times 100\%$$

$$\text{Peningkatan Persentase} = 3,81 \%$$

Based on the results of the above writing, an increase in the percentage of anaerobic endurance with the small sided games exercise method was obtained by 3.81%.

Table 4. Anaerobic Endurance Data Statistics with Small Sided Games Exercise Method

Respondents	RATS Group 1 (Pretest)	RATS Group 1 (Posttest)
<i>Mean</i>	9,89	4,56
<i>Median</i>	10,05	3,49
<i>Mode</i>	2.15 ^a	1.58 ^a
<i>Std. Deviation</i>	4,35	2,86
<i>Minimum</i>	2,15	1,58
<i>Maximum</i>	18,67	13,12
<i>Sum</i>	148,40	68,43

Table 5. Anaerobic Endurance Data with Small Sided Games Exercise Method

Norm	Category	Pretest		Posttest	
		Frequency	Percentage	Frequency	Percentage
0 – 4	Very good	1	6,67	8	53,33
4,1 – 10	Good	6	40	6	40
10,1 – 15	Keep	6	40	1	6,67
15,1 – 20	Less	2	13,33	0	0
> 20	Very less	0	0	0	0
Sum		15	100	15	100

Based on the results of the writing above, the average score during the pretest was 9.89, and the average posttest was 4.56. To determine the magnitude of the increase in fatigue index with the small sided games training method in this writing using the percentage increase formula.

$$\text{Peningkatan Persentase} = \frac{5,33}{9,89} \times 100\%$$

$$\text{Peningkatan Persentase} = 53,88 \%$$

From the results of the study above, an increase in the percentage of fatigue index with the small sided games exercise method was obtained by 53.88%.

Table 6. Normality Test

	Variable	p	Sig.	Information
Research Data	Small Sided Games (Anaerobic Endurance) Exercise			
	Small Sided Games Exercise (Fatigue Index)	0,074	0,05	Usual
		0,236	0,05	Usual

From the table above, it shows that the significance value (p) of all variables is greater than 0.05, so the data is normally distributed. Since all data is normally distributed, the analysis can be continued with parametric statistical analysis.

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Table 7. Homogeneity Test

F	df1	df2	Sig.
3,981	3	56	0,064

Based on the table data above, a significant level value (0.064) > 0.05 is obtained so that it can be concluded that variance is homogeneous.

Table 8. Paired Sample t Test Hypothesis Test

	<i>Pretest – posttest</i>	df	t _{tabel}	t _{hitung}	P	Sig 5 %
Anaerobic endurance		14	2,144	9,595	0,000	0,05
Fatigue index	14	2,144	5,241	0,000	0,05	

Based on the results of the analysis of table 11, for anaerobic endurance data, a calculated t_{value} of 9.595 ≥ t_{table} 2.144 was obtained, meaning that there was an effect of the small sided games training method on increasing the anaerobic endurance of U-17 players. The results of the t-test analysis on the fatigue index obtained a calculated t_{value} of 5.241 ≥ t_{table} 2.144, meaning that there is an influence of the small sided games training method on the improvement and fatigue index of U-17 players.

IV. DISCUSSION

The SSG training method is a training method carried out by dividing players into small groups, usually around 3-6 players [17]. Each group will play on a small field with predetermined rules of play, such as the number of players, field size, playing time, and so on. The purpose of this method is to improve the technical and tactical skills of players in real game situations. Anaerobic endurance is the body's ability to maintain high-intensity physical activity over a relatively short period of time, which is about 30 seconds to 2 minutes [18]. Meanwhile, the fatigue index is a measure used to evaluate the body's level of fatigue at the time of physical activity [19]. The fatigue index can be measured in various ways, such as by measuring blood lactate levels or by using the Rating of Perceived Exertion (RPE) scale.

Several papers have been done to examine the effect of SSG exercise methods on improving anaerobic endurance and fatigue index. One of the relevant writings is that done by [20]. This writing involved 22 football players aged 14-15 years who were divided into two groups: the SSG group and the control group. The SSG group exercised with the SSG method for 8 weeks, while the control group exercised with the conventional method. The results showed that the SSG group experienced a significant increase in anaerobic endurance and decreased fatigue index than the control group.

Another relevant study was conducted by [21] This writing involved 12 futsal players who were divided into two groups: the SSG group and the control group. The SSG group did exercises with the SSG method for 4 weeks, while the control group did exercises with conventional methods. The results showed that the SSG group experienced a significant increase in anaerobic endurance and decreased fatigue index than the control group.

The SSG training model is one of the training methods created using games [22]. SSG training requires a player to constantly perform movements so that anaerobic abilities will improve [23]. In order to be able to reach it all and be able to feel the results. By performing movements in a game, players are trained to maintain their endurance so that they will have good endurance during the match [24]. SSG itself is a commonly used training method in football training This exercise requires players to move dynamically [25]. The benefits of SSG training methods in football include increasing cardiovascular endurance [26].

V. CONCLUSION

Based on the calculation of hypothesis 1 analysis using the t test obtained on endurance obtained the value of t count (9.595) ≥ t_{table} (2.144), and on the fatigue index obtained the value of t count (5.241) ≥ t_{table} (2.144), based on these results it is interpreted that there is an influence of SSG exercise methods on increasing anaerobic endurance and fatigue index of players. The choice of the SSG method is highly recommended, because the method accommodates all the conditions of the real football game when competing, so the application of this method causes training adaptations that greatly affect the ability of players in matches. Along with increasing cardiovascular or cardiopulmonary endurance, it can reduce the fatigue index in football players.

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