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Impact of the small sided games training method on the anaerobic endurance of U-17 soccer players
Impacto de los métodos de entrenamiento de juegos pequeños en la resistencia anaeróbica de los jugadores de fútbol sub-17

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Abstract. This study aims to determine the effect of the small side games training method on the anaerobic endurance of soccer players aged U-17. The design used in this study is an experimental method. This experimental study used the small side games training method as the independent variable, and anaerobic endurance as the dependent variable. The population in this study were Seyegan United players in the age group of 15-17 years, totaling 32 players. To determine the sample to be studied, the researcher used a purposive sampling technique, namely a sampling technique with certain considerations. The research sample was measured using a 30 meter running test which aimed to find players who had good speed, and obtained 15 players who had good speed. The results of this study showed that the small side games training method had an effect on anaerobic endurance, as evidenced by the anaerobic endurance data obtained by t count (9.595) ≥ t table (2.144). Recent research is needed to develop small side games training methods to be more varied, innovative and creative in order to develop the achievements of young players in the sport of football. The development of small side games training methods to increase anaerobic endurance can be in the form of the number of players, the size of the field, the intensity of the exercise, and the duration of the exercise.
Keywords: Football, Training Methods, SSG, Endurance, Anaerobic

Resumen. Este estudio tiene como objetivo determinar el efecto del método de entrenamiento de juegos secundarios sobre la resistencia anaeróbica de jugadores de fútbol sub-17. El diseño utilizado en este estudio es un método experimental. Este estudio experimental utilizó el método de entrenamiento de juegos laterales pequeños como variable independiente y la resistencia anaeróbica como variable dependiente. La población de este estudio fueron jugadores de Seyegan United en el grupo de edad de 15 a 17 años, con un total de 32 jugadores. Para determinar la muestra a estudiar, el investigador utilizó una técnica de muestreo intencional, es decir, una técnica de muestreo con ciertas consideraciones. La muestra de la investigación se midió mediante una prueba de carrera de 30 metros cuyo objetivo era encontrar jugadores que tuvieran buena velocidad, y se obtuvieron 15 jugadores que tenían buena velocidad. Los resultados de este estudio mostraron que el método de entrenamiento de juegos laterales pequeños tuvo un efecto sobre la resistencia anaeróbica, como lo demuestran los datos de resistencia anaeróbica obtenidos por el recuento t (9,595) ≥ tabla t (2,144). Se necesitan investigaciones recientes para desarrollar métodos de entrenamiento de juegos secundarios que sean más variados, innovadores y creativos para desarrollar los logros de los jugadores jóvenes en el deporte del fútbol. El desarrollo de métodos de entrenamiento en pequeños juegos paralelos para aumentar la resistencia anaeróbica puede consistir en el número de jugadores, el tamaño del campo, la intensidad del ejercicio y la duración del ejercicio.
Palabras clave: Fútbol, Métodos de entrenamiento, SSG, Resistencia, Anaeróbico

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Introduction

Football is the most widely practiced sport in the world and one of the fundamental elements in sports (Meneguite et al., 2022). The facts also show that most coaches consider football as a means to educate players, while young coaches believe in football more as a means to spread values (Paixao et al., 2021). The game of football requires good physical condition. Good physical condition is needed in combining the technical, tactical and mental skills of soccer players (Maliki et al., 2017). This is in line with the opinion that success in the game of football requires skilled ball control (Bodasińska et al., 2019). Skillful possession of the ball requires good physical condition. Physical condition is an important element and becomes the basis or foundation in the development of techniques, tactics, strategies and mental development. Good physical condition is one way to achieve maximum performance (Pratama & Imanudin, 2019). Physical condition has a very important role in all sports (Hermawan et al., 2022). Football athletes must have excellent physical condition in all components, such as passing, dribbling, shooting, juggling and heading (Dahlan et al., 2020). To maintain the basic techniques of a good game, it is necessary to be supported by prime physical conditions, namely endurance, strength, agility, speed, and coordination. (Hamdi et al., 2019). Physical development aims to form good posture, including in anatomy and physiology through health and physical abilities which include speed, agility, endurance, strength, and flexibility (Suharto et al., 2022). Considering maximum performance in sports, athletes are needed who have a high level of physical fitness. Among the main physical components, overall fitness and movement fitness play an important role in competitive sports, especially those involving muscles. The importance of this research is that the game of soccer is a sport that demands explosive movements such as kicking, tackling, jumping, running, and changes in direction. fast. The effectiveness of training is very important to achieve success in football matches (Firmansyah et al., 2024).

Getting in good physical condition certainly requires exercises that can improve and develop the physical condition and functional abilities of the body's systems (Mansur et al., 2020). Training is a long and lengthy process so practice must be carried out systematically (Mikail & Suharjana, 2019). Small sided game is a training program

used by coaches to stimulate the technical, tactical and physical performance components of soccer players (Clemente et al., 2021). Training is a systematic training process that is carried out repeatedly, and has the aim of increasing the training load from day to day (Tibana et al., n.d.); (Clemente et al., 2019). An effective form of training is training that resembles a real match, one of which is small sided games. Small sided games are games on a small field that are played by less than eleven players (Gómez-Carmona et al., 2018); (Clemente et al., 2021); (Bujalance-moreno et al., 2018); (Gabbett et al., 2017). Small sided games are a form of training that is carried out in a small game and athletes have more contact with the ball, because the area of the field used is limited, and the number of players is not the same as in the real match. Small sided game exercises can develop technical skill abilities, tactics, mentality and physical condition (Selmi et al., 2018). In general, there are many variations of small sided games, this is intended to make athletes feel bored. One of the things you can do to get rid of boredom is to practice playing soccer, namely 3v3 and 4v4. Several previous studies have revealed that the use of the SSG (small side games) format with an unequal number of players (4v5, 5v6) in training can be beneficial for the development of DM (decision-making), and therefore can be an important factor to consider in the formation of soccer players young (Sousa et al., 2021). Small sided games are a suitable training tool or method for improving technique. The smaller the number of players, the higher the number of technical actions (passing, dribbling and shooting) and contact with the ball (Clemente et al., 2019). Small sided games training can be used as an effective exercise when players are doing 3v3 drills, because athletes have more passing, dribbling, and shooting skills. The more often a player passes, dribbles, and kicks, automatically requires stronger endurance (Sgrò et al., 2018). Young football players are the key to developing a career in the world of football. Previous research revealed that the majority of players only trained for 4 years at the club, with a market revaluation after three years of an average of 15.57 million euros, namely those who joined the club at the ages of U15-16 and U13-U14 who tended to gain the most value. big over time. It can be concluded that the procedures used in this research can be very useful in analyzing the training process of football players and the resulting profitability for their clubs (Martín Barrero, 2022). According to previous research, it was revealed that the number of targets (T) and scoring zones (SZ) in SSGs seemed to influence training load. SSG with 1 goal scorer (1G) and SZ at the end of the pitch demands more physical effort when compared to 2 goal scorers (2G) and 3 goal scorers (3G). SSGs with more T require higher tactical performance. Therefore, coaches must use different SSG, SZ, or goal scoring (G) strategy formats according to the objectives of the training session. (Malheiro Maia Junior et al., 2023). The novelty of this study is to provide evidence that the small side games training method has an effect on the anaerobic endurance of young soccer players. The creativity of coaches in making small side games training programs is an important factor in increasing the endurance of young soccer players.

Method

Subjects/ Participants

The design used in this study is an experimental method. This experimental study used the small side games training method as the independent variable, and anaerobic endurance as the dependent variable. This research was conducted on July 28 2021. The research location was carried out at the Seyegan United Soccer School which is located in Lap. Margokaton, Seyegan, Sleman, Special Region of Yogyakarta. The population in this study were Seyegan United players in the age group of 15-17 years totaling 32 players. To determine the sample to be studied, the researcher used a purposive sampling technique, namely a sampling technique with certain considerations. Researchers used purposive sampling because; (1) The selected sample is a sample that is in accordance with the research objectives; (2) This technique is easy to implement; and (3) The selected samples are usually individuals or individuals who are easy for researchers to meet or approach. The research sample was measured using a 30-meter run test which aimed to find players who had good speed, and obtained 15 players who had good speed.

Preliminary results data to determine the research sample.

Table 1.
30 meter running test results

No	Sample Name/Initials	Result	Category
1.	AZ	3.59	Very well
2.	DF	3.40	Very well
3.	GH	3.44	Very well
4.	FH	3.35	Very well
5.	IK	3.47	Very well
6.	AD	3.94	Good
7.	AS	4.33	Good
8.	AF	4.20	Good
9.	AB	4.26	Good
10.	NB	3.30	Very well
11.	LU	3.58	Very well
12.	MI	3.48	Very well
13.	AZ	3.49	Very well
14.	DF	4.21	Good
15.	BN	3.37	Very well
16.	KL	4.76	Less
17.	UI	4.80	Less
18.	YY	5.12	Not enough
19.	TK	5.25	Not enough
20.	LH	5.30	Not enough
21.	MB	5.14	Not enough
22.	ND	5.64	Not enough
23.	RA	6.34	Not enough
24.	ER	5.13	Not enough
25.	EF	5.32	Not enough
26.	TH	4.74	Less
27.	MD	4.80	Less
28.	WD	4.14	Less
29.	SA	4.19	Less
30.	DF	4.25	Less
31.	GH	4.87	Less
32.	GL	5.12	Not enough

Table 2.
30 meter running speed norm

No	Norm	Performance (Seconds)
1.	Very well	3.58-3.91
2.	Good	3.92-4.34
3.	Currently	4.35-4.72
4.	Less	4.73-5.11
5.	Not enough	5.12-5.50

Source (Wiriawan, 2017)

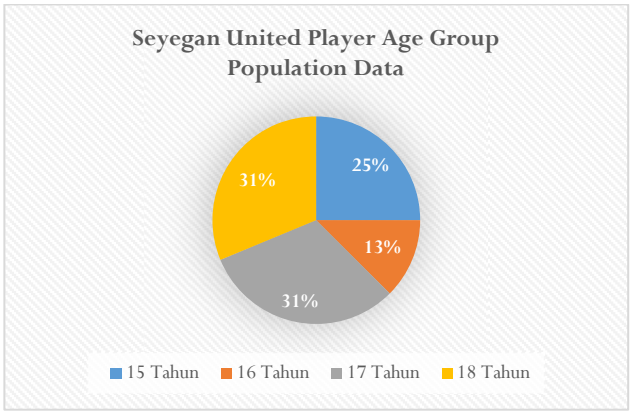

Figure 1. Seyegan United Player Age Group Population Data

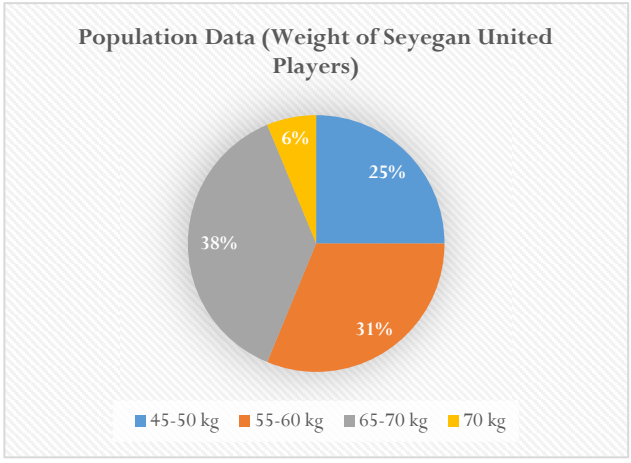

Figure 2. Population Data (Weight of Seyegan United Players)

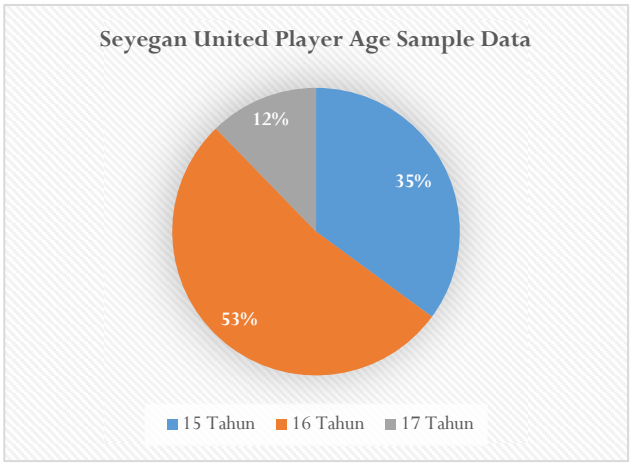

Figure 3. Seyegan United Player Age Sample Data

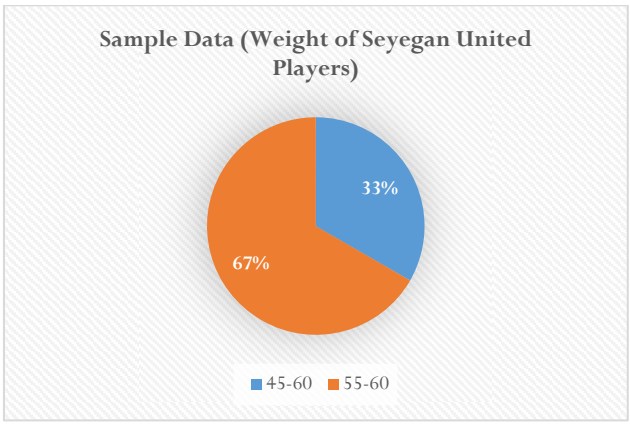

Figure 4. Sample Data (Weight of Seyegan United Players)

Results

The data from this research is in the form of pretest and posttest data which is an overview of each variable.

Table 3.
Statistical Table of Anaerobic Endurance Data Using the Small Sided GamesResearch Data Exercise Method

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

Tabel 4.
Anaerobic Endurance Data Using Small Sided Games Exercise Method

Category	Intervals	Pretest		Posttest	
		Frequency	Percentage	Frequency	Percentage
Very well	31.80 – 38.95	0	0	0	0
Good	38.98 – 44.59	0	0	0	0
Currently	44.60 – 49.89	9	60	12	80
Less	49.90 – 55.29	6	40	3	20
Not enough	55.30 – 60.59	0	0	0	0
Amount		15	100	15	100

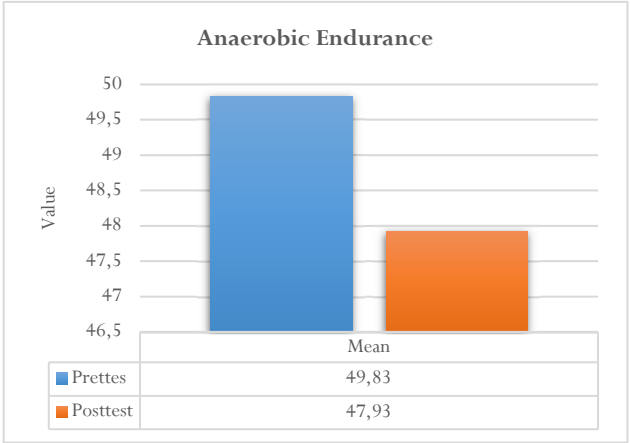

Figure 5. Increased Anaerobic Endurance

Based on the results of the research above, the average value 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 training method in this study using the percentage increase formula.

$$\text{Percentage Increase} = \frac{mean\ different}{mean\ pretest} \text{X } 100\%$$

$$\text{Percentage Increase} = \frac{1{,}90}{49{,}83} \text{X } 100\%$$

$$\text{Percentage Increase } = 3{,}81\ \%$$

Normality test

The purpose of the normality test is to find out whether the data obtained from each analyzed variable actually follows a normal distribution pattern or not. The variable normality test was carried out using the Shapiro Wilk formula. The rule used to determine whether a distribution is normal or not is that $p > 0.05$ the distribution is considered normal, and if $p < 0.05$ the distribution is said to be abnormal.

Table 5.
Normality test

Variable	*p*	*Sig.*	Information
Anaerobic Endurance	*0,074*	*0,05*	Normality

Homogeneity test

Table 6.
Homogeneity test

Levene's Test of Equality of Error Variances[a]			
Dependent Variable: Hasil penelitian			
F	df1	df2	Sig.
3,981	3	56	0,064

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

Uji T

The effect of the small sided games training method on increasing the anaerobic endurance of football players, in this study used the paired sample t test. The t test results can be seen in the table below:

Table 7.
Uji t

Pretest – posttest	df	t_{tabel}	t_{hitung}	*P*	Sig 5 %
Anaerobic Endurance	14	2,144	9,595	0,000	0,05

Based on the results of the analysis, for anaerobic endurance data, the t value was obtained (9.595) ≥ t table (2.144), which means that there is an influence of the small sided games training method on increasing the anaerobic endurance of football players.

Discussion

The Small Sided Games (SSG) training method is a training method that is carried out by dividing players into small groups, usually around 3-6 players.

Each group will play on a small field with predetermined game rules, such as number of players, size of the field, playing time, and so on. Several previous studies revealed that small side games can develop physical, technical and tactical abilities. Two-on-two or three-on-three games significantly elevate the higher intensity (Manoj Kumar et al., 2020). The game of football requires good physical condition, good skills such as passing. Based on previous research, it was revealed that the small side games training method had a significant effect on passing skills with an increase of 14.55%. This research can be useful and can be used as additional material for training studies in football games and passing skills as a basis for making training programs to improve player performance, as well as providing theoretical and practical evidence for coaches (Walid Djaba, 2022). This is also reinforced by the opinion that the method of small side games and coordination exercises can increase aerobic endurance. However, playing small sided games has been proven to be more effective and efficient in increasing aerobic endurance abilities (Miftachurochmah et al., 2023). The aim of the small side games training 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 for a relatively short period of time, namely around 30 seconds to 2 minutes. The small-sided games training model is a training method that is created using games. Small-sided games training requires a player to constantly move so that anaerobic abilities will increase. By making movements in a game, players are trained to maintain their body's endurance so that they will have good endurance during the game. Small-sided games themselves are a training method commonly used in football training. This exercise requires players to move dynamically. The benefits of the small side games training method in the sport of football include increasing cardiovascular endurance. Choosing the small side games method is highly recommended, because this method accommodates all conditions of real football games when competing, so that the application of this method creates training adaptations that have a big impact on the players' abilities in the match. By increasing cardiovascular or cardiorespiratory endurance, it can reduce the fatigue index in football players. Opinions regarding small side games training for young players, namely SSG players, the workload varies depending on the number of players, but also depends on the age of the players. Therefore, when designing an SSG it is important to consider the age of the player and the workload to be achieved (López-Fernández et al., 2020) Several studies have revealed that the small side games training method can improve physical condition. Physical capacity in the form of speed, strength, endurance, and flexibility is related to the metabolic potential and muscle mechanics, which, when properly oriented according to the demands of the game, can be factors that contribute to the performance and health status of athletes (Gonzalez Vargas & Gallardo Pérez, 2023).

According to previous research, it has been revealed that a combination of soccer and plyometric methods and resistance methods can be used to develop the neuromuscular capacity of young soccer players in general (Falces et al., 2021). Based on data analysis, this study resulted that there was an effect of the small sided games training method on increasing the anaerobic endurance of soccer players.

Conclusion

This research found that the small side games training method had an influence on anaerobic endurance, as evidenced by the anaerobic endurance data obtained by the calculated t value (9.595) ≥ t table (2.144). New research is needed to develop small side games training methods to be more varied, innovative and creative in order to develop the achievements of young players in the sport of football. The development of small side games training methods to increase anaerobic endurance can take the form of the number of players, size of the field, intensity of training, and duration of training.

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Nothing to declare

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