

Anaerobic Training: The Key To Peak Fitness For Young Pencak Silat Athletes Aged 13-15

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Abstract

Currently, students often face fitness challenges, such as easily experiencing fatigue during physical activities. One type of physical exercise that can improve fitness is anaerobic training. This study aims to obtain empirical data on the effect of anaerobic training on students' physical fitness. The research was conducted over a two-month period, from August to September 2025. The research method used was a quasi-experimental design with a one-group pretest-posttest model. The subjects of this study were 30 participants from the Pencak Silat extracurricular program at Ar Rasyidul Karim Boarding School. The instrument used to measure fitness was the *simulasi asesmen kebugaran kemdikbud*. The results showed that the application of anaerobic training significantly affected students' fitness levels. Based on the t-test results, the calculated t-value was 8.5. This value was then compared with the t-table value at a 5% significance level ($\alpha = 0.05$) and a degree of freedom (df) of 29, which was 1.699. Since the calculated t-value (8.5) > t-table value (1.699), it can be concluded that there is a significant difference between the pretest and posttest scores. These findings indicate that anaerobic training is effective as a strategy to improve students' physical fitness.

Keywords: Anaerobic Training, Fitness, quasi-experimental design

1 INTRODUCTION

Sports are one of the essential aspects of individual development, particularly at the school level. In the school environment, physical education not only aims to improve physical health but also to develop motor skills, build character, and foster teamwork. Through structured physical activities, students not only learn how to move but also develop social and emotional skills, such as cooperation and self-control, which contribute to character building (Candra et al., 2023; Alsaudi, 2024). However, the main challenge in physical education at schools lies in ensuring the effectiveness of learning strategies that can enhance students' performance, both as learners and as athletes.

Education itself is an inseparable part of human life. Everyone receives education from birth, with parents playing a vital role in shaping it. Nevertheless, education cannot rely on one party alone to create a qualified and dignified generation. The first educational environment for individuals is the family, followed by school and the community. Physical education is one of the compulsory subjects in schools. This subject develops three learning domains—affffective, psychomotor, and cognitive—through both theoretical and practical activities. Physical education, sports, and health seek to achieve educational goals through physical activity (Alsaudi et al., 2025). One of the key objectives of physical education is to improve students' physical fitness.

According to Afandi Ahmad and Miftah Azrin (2019), physical fitness is the body's ability to perform daily tasks efficiently for a relatively long period without experiencing undue fatigue. There are five basic components of physical fitness: cardiovascular endurance, muscular strength, muscular endurance, flexibility, and body composition. Several factors

influence physical fitness, including genetics, age, gender, exercise habits, smoking behavior, and nutritional status. Regular exercise significantly affects physical fitness, especially in terms of intensity, frequency, and duration of training. Developing a habit of exercise can greatly enhance fitness and provide a positive outlet for self-expression (Ilyas, 2020).

The term physical fitness is often translated into Indonesian as *kebugaran jasmani* or *kesegaran jasmani*. Among these, *kebugaran jasmani* is the most widely used term. Literally, physical fitness refers to bodily suitability or physical well-being, but the word fit also implies health. Thus, fitness can also mean being healthy (Santoso Giriwijoyo & Dikdik Zafar Sidik, 2013).

Anaerobic exercise refers to physical training performed without sufficient oxygen supply, causing shortness of breath and generating quick bursts of energy in a short period. This type of exercise is performed with high intensity but for short durations. It stimulates muscle activity at a high level of intensity, which can enhance muscular strength and endurance (Saptono et al., 2021).

The development of anaerobic power occurs through two mechanisms: the alactic anaerobic mechanism (which does not produce lactic acid) and the lactic anaerobic mechanism (which produces lactic acid) (Santoso Giriwijoyo & Dikdik Zafar Sidik, 2013). However, in the context of adolescents, few studies have specifically examined the effect of anaerobic training on their physical fitness.

Given the importance of physical fitness for students and the potential benefits of anaerobic exercise, this study aims to determine the extent to which anaerobic training can influence the physical fitness of students aged 13–15 years. The results of this study are expected to serve as a reference for physical education teachers, coaches, and parents in designing effective training programs suited to the developmental needs of students at this age, thereby fostering a healthy, fit, and productive young generation.

The researcher observed that members of the Pencak Silat extracurricular program at Ar Rasyid Islamic Boarding School often experience fitness-related challenges, such as getting fatigued easily, which reduces their performance during both individual and team competitions. Therefore, the author addressed this issue through research entitled "Anaerobic Training: The Key To Peak Fitness For Young Pencak Silat Athletes Aged 13-15."

2 RESEARCH METHODS

In this study, the researcher employed an experimental research design. According to Azka Dhianti Putri et al. (2023), experimental research is a type of study that seeks to determine a causal relationship between independent and dependent variables, in which the independent variable is deliberately controlled and manipulated.

For the research variables, the researcher used quantitative variables. Handayani and Ririn (2020) explain that, according to Sugiyono, quantitative research is a research method based on the philosophy of positivism—something certain, actual, and grounded in empirical data. It is used to study specific populations or samples, with data collected through research instruments. The data analysis is statistical or numerical in nature and aims to test predetermined hypotheses.

The research design applied in this study was the One-Group Pretest-Posttest Design. Beti Arliana et al. (2022) state that, according to Sugiyono, a pre-experimental study with a One-Group Pretest-Posttest design is an experimental design involving a single group of samples, in which measurements are conducted both before and after the treatment is administered to the sample.

2.1 Research Implementation

2.1.1 Pretest

The pretest, or initial test, was conducted before the students received the treatment or anaerobic training. The purpose of this stage was to determine the physical fitness level of the Pencak Silat extracurricular students at Ar Rasyidul Karim Islamic Boarding School.

2.1.2 Treatment

The treatment given to the students in this study was anaerobic training.

2.1.3 Posttest

The posttest was administered at the end of the training sessions to assess the physical fitness level of the Pencak Silat extracurricular students at Ar Rasyidul Karim Islamic Boarding School after receiving the anaerobic training treatment.

2.2 Research Time and Location

2.2.1 Research Time

The research was conducted from August to September 2025, consisting of 16 meetings in total, with two sessions held each week.

2.2.2 Research Location

The study was carried out at Ar Rasyidul Karim Boarding School, located at Jl. Swadaya No. 27, Pondok Rajeg, Cibinong District, Bogor Regency, West Java Province.

2.3 Population, Sample, and Sampling Technique

2.3.1 Population

According to Hutami, Wanda Femila (2024), a population is a generalization area consisting of objects or subjects that possess certain qualities and characteristics determined by the researcher to be studied and from which conclusions are drawn. Based on this definition, the population in this study consisted of 30 male students who participated in the Pencak Silat extracurricular program at Ar Rasyidul Karim Boarding School.

2.3.2 Sample

A sample is a portion of the population that possesses the same characteristics as the population as a whole. Hutami, Wanda Femila (2024) defines a sample as a group of individuals selected from the population that represents the entire population.

2.3.3 Sampling Technique

In this study, the researcher employed a total sampling technique, in which the entire population is used as the research sample. Therefore, the sample consisted of 30 male students who were members of the Pencak Silat extracurricular program at Ar Rasyidul Karim Boarding School.

2.4 Data Collection Techniques

Data collection techniques refer to the methods used by researchers to gather data. This study employed a pre-experimental design using a pretest–posttest group model. The data collection technique used in this study involved experimentation and measurement with validated research instruments. The pretest was administered to students before the treatment to assess their initial level of physical fitness. The treatment (anaerobic training) was implemented during the Pencak Silat extracurricular activities.

3 RESULT AND DISCUSSION

3.1 Data Analysis Techniques

3.1.1 Pretest–Posttest Data

To measure the physical fitness of the Pencak Silat extracurricular participants at Ar Rasyidul Karim Boarding School before receiving the anaerobic training treatment, a pretest of fitness level was conducted. The results of the pretest were then analyzed as a basis for implementing the anaerobic training treatment. The descriptive statistical analysis of the participants' pretest fitness levels is as follows:

Table 1. Descriptive Analysis of the Pretest

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
pretest	30	12	19	16.30	1.985
Valid N (listwise)	30				

Based on the table, it can be seen that the participants of the Pencak Silat extracurricular program at Ar Rasyidul Karim Boarding School obtained an average fitness score of 16.30 with a standard deviation of 1.98. The highest score was 19, while the lowest was 12. These results have not yet met expectations, as many participants still showed relatively low levels of physical fitness. Based on the researcher's observations, the low fitness levels were due to weaknesses in several components of physical fitness. Therefore, a treatment was needed to improve the participants' fitness levels. Anaerobic training was implemented for this purpose, carried out over a period of eight weeks. From the pretest analysis results, it was concluded that anaerobic training needed to be conducted to enhance the physical fitness of the Pencak Silat extracurricular participants at Ar Rasyidul Karim Boarding School.

Table 2. Descriptive Analysis of Pretest - Posttest

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
pretest	30	12	19	16.30	1.985
posttest	30	14	21	18.03	1.810
Valid N (listwise)	30				

The posttest of physical fitness was conducted after the completion of the entire series of anaerobic training treatments. The procedure was the same as the pretest, in which each participant was given the opportunity to perform the fitness test. A comparison of the posttest and pretest results can be seen in Table 3. From the table, it can be observed that all participants showed an increase in their posttest scores.

3.1.2 Normality Test

After obtaining the pretest and posttest physical fitness results, a normality test was conducted using the Shapiro-Wilk method. The results can be seen in the following table:

Table 3. Normality Test

Shapiro-Wilk			
Normalities	Statistic	df	Sig.
Pretest	.919	20	.093
Posttest	.949	20	.345

Conclusion

Pretest: Sig = 0.093 > 0.05 → H_0 accepted

Posttest: Sig = 0.345 > 0.05 → H_0 accepted

Based on the presented data, it can be concluded that the data are normally distributed, allowing for the use of parametric tests, specifically the t-test.

3.1.3 Paired Samples T Test

Table 5. Paired Samples T Test

Paired Samples Test		Paired Differences							
		Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	pretest posttest	-1.733	1.112	.203	-2.149	-1.318	-8.537	29	.000

Based on the paired sample t-test, the calculated t-value (8.53) is greater than the critical t-value (1.699), so H_0 is rejected and H_1 is accepted. This indicates that there is a significant difference in the fitness levels of the Pencak Silat extracurricular participants at Ar Rasyidul Karim Boarding School before and after undergoing anaerobic training.

4 CONCLUSION

Based on the research conducted, the effect of anaerobic training on improving physical fitness in the sport of Pencak Silat was studied in 30 students as research subjects. According to the statistical test results using a paired sample t-test, the calculated t-value was 8.5, with a critical t-value of 1.699 at a 5% significance level ($\alpha = 0.05$) and 29 degrees of freedom (df). Since the calculated t-value is greater than the critical t-value, it can be concluded that there is a significant difference between the pretest and posttest scores. Therefore, it can be concluded that the anaerobic training method effectively influences fitness by significantly improving the physical fitness of the Pencak Silat extracurricular participants. This effect is evident from the participants' ability to perform simulated match exercises without experiencing excessive fatigue.

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