

The Effectiveness of Circuit Training in Improving Performance and Fitness of School Basketball Students

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Abstract

Students participating in the basketball extracurricular program at SMPN 258 Jakarta often face fitness challenges, such as easily feeling fatigued during training or competitions. One type of physical activity that can improve fitness is anaerobic exercise, particularly through the implementation of *circuit training*. This study aims to obtain empirical data regarding the effect of *circuit training* on students' physical fitness. The research was conducted over a period of three months, from June to August 2025. The research method used was a quasi-experimental design with a one-group pretest-posttest design. The subjects of this study were 25 students who participated in the basketball extracurricular program. Fitness data were collected using the Kemdikbud fitness assessment simulation before and after the implementation of *circuit training* for 12 weeks. The results showed that the application of *circuit training* had a significant effect on students' fitness levels. Based on the Wilcoxon test, all variables obtained p-values **less** than 0.05, indicating a significant difference between the pretest and posttest results. Therefore, it can be concluded that the treatment applied in this study significantly improved students' physical fitness through the implementation of *circuit training*.

Keywords: Circuit training, physical fitness, anaerobic exercise, basketball, quasi-experimental design

1 INTRODUCTION

Mahfud, I., Gumantan, A., & Nugroho, R. A. (2020) Physical fitness is the ability to perform daily activities without experiencing excessive fatigue. A person's physical fitness is influenced by several factors, including genetics, gender, age, body composition, activity level, and exercise habits. Therefore, physical fitness is often used as a parameter of health and as a measure of maximal aerobic capacity and cardiorespiratory fitness.

Maulana, R. A., Friskawati, G. F., & Karisman, V. A. (2024) Physical fitness is also commonly defined as the body's ability to efficiently adjust its organ functions within physiological limits in response to environmental conditions or physical workloads without causing undue fatigue.

Circuit training is a type of exercise that involves performing a series of different workouts in sequence. In one circuit, students complete several types of exercises with little or no rest between them.

This concept is not only physically challenging but also adds enjoyable variety to the training routine. In circuit training, students complete each exercise for a specific number of repetitions or a set amount of time. Because the exercises are performed in rapid succession, a full circuit training session can typically be completed in just 30–45 minutes.

Circuit training is expected to improve children's physical fitness so that, with better fitness levels, students can perform school activities more effectively. With good endurance, students are less likely to fall ill, creating a more conducive learning environment. Circuit training is one of the most efficient methods to improve physical

fitness because it requires minimal equipment and cost, while also remaining engaging due to the variety of exercises involved.

2 RESEARCH METHODS

The method used in this study was the experimental method. The experimental method is a type of research used to test causal relationships between two or more variables by controlling and manipulating the independent variable. A research method is a series of procedures or techniques employed in a research activity to obtain valid data that can be used to solve the problem under investigation (Hadi, Sutrisno, 2020).

The purpose of this experimental study was to determine whether changes in one variable could cause changes in another variable. The overall aim of the research was to obtain accurate and valid information to answer the research problem and to contribute to the development of knowledge in the relevant field (Arikunto, 2020).

This study employed a quantitative research approach. Quantitative research is characterized by the use of numerical data throughout the research process—from data collection in the field to data interpretation and presentation of results (Andi Fitriani Djollong, 2014). This approach emphasizes numerical analysis and statistical interpretation to ensure objectivity and accuracy.

The research design used in this study was the Pretest–Posttest Control Group Design. In this design, the effect of a treatment on the dependent variable is tested by comparing the condition of the dependent variable in the experimental group (which receives the treatment) with that of the control group (which does not receive the treatment).

The experimental method used in this study involved only one group, which was measured twice. The first measurement (pretest) was conducted before the treatment, followed by the administration of the treatment, and finally the second measurement (posttest) was conducted after the treatment. The design of the study can be illustrated as follows:



Explanation:

Y₁ : Initial measurement (pretest)

X: Treatment (anaerobic exercise)

Y₂ : Final measurement (posttest)

2.1 Research Implementation

2.1.1 Pretest

The pretest or initial test was conducted to measure the initial abilities of the basketball extracurricular students at SMPN 258 Jakarta before the researcher provided the treatment.

2.1.2 Treatment

The treatment stage refers to the phase in which the researcher provided the training. In this study, the researcher administered a Physical Fitness Test using circuit training as the exercise method.

2.1.3 Posttest

The posttest or final test was conducted during the last session to measure the physical fitness level of the basketball extracurricular students at SMPN 258 Jakarta after receiving the circuit training treatment.

2.2 Research Time and Location

2.2.1 Research Time

The research was carried out from June to August 2025, consisting of 16 meetings, with training sessions conducted 2–3 times per week.

2.2.2 Research Location

The study was conducted at SMPN 258 Jakarta, located at Jl. Cibubur II Blok Duku, RT 15/RW 10, Cibubur Subdistrict, Ciracas District, East Jakarta City Administration, DKI Jakarta Province, Postal Code 13720.

2.3 Population, Sample, and Sampling Technique

The population refers to the entire group of objects or subjects under study, while the sample represents a portion of the population that possesses representative characteristics. Determining an appropriate sample requires a thorough understanding of sampling techniques, including determining the correct sample size and identifying which members of the population to include. Errors in defining the population can result in inaccurate data collection, which in turn leads to poor-quality, non-representative research results that lack generalizability.

A researcher's understanding of population and sampling is therefore essential, as it determines the accuracy of data collection. The sampling technique used in this study was total sampling, meaning that all members of the population were included as research subjects. The population in this study consisted of 25 male students who participated in the basketball extracurricular program at SMPN 258 Jakarta.

In this research, the focus was solely on male students, so the total number of research subjects was 25 male basketball extracurricular students. Amin, N. F., Garancang, S., & Abunawas, K. (2023) A population is a generalization area consisting of objects or subjects that have specific qualities and characteristics determined by the researcher for study and from which conclusions are drawn. Based on this definition, the population in this study comprised 20 male students participating in the basketball extracurricular program at SMK Al-Fajar Jakarta.

2.4 Data Collection Techniques

The Wilcoxon test is used to compare two paired samples (for example, before and after treatment) under the assumption that the data are not normally distributed.

1. Calculate the difference between each pair of data.
2. Remove pairs with a difference of zero.
3. Calculate the absolute value of the differences.
4. Rank the values from smallest to largest; if there are ties, assign the average rank.
5. Assign positive or negative signs according to the direction of the difference.
6. The Wilcoxon test statistic (T) is the smaller of the two rank sums (positive or negative).
7. For large samples ($n > 25$), the T statistic can be approximated by the normal distribution.
8. Decision Rule:
9. If $p < \alpha$ (e.g., 0.05), there is a significant difference between the two conditions (before and after).
10. If $p \geq \alpha$, there is no significant difference.

3 RESULT AND DISCUSSION

To examine whether circuit training had a significant effect on improving the physical fitness of basketball extracurricular students, a hypothesis test was conducted using the Wilcoxon Signed-Rank Test.

Table 1. Wilcoxon Signed-Rank Test

Variable	Wilcoxon Statistic	p-value	Description
Broad Jump	0.0	0.000 ($p < 0.05$)	Significant difference
Sit Up	0.0	0.000 ($p < 0.05$)	Significant difference
Hand-Eye Coordination	0.0	0.000 ($p < 0.05$)	Significant difference
Beep Test	0.0	0.000 ($p < 0.05$)	Significant difference
T-Test (seconds)	0.0	0.000 ($p < 0.05$)	Significant difference

Based on the Wilcoxon test results shown in the table above, all variables have p -values smaller than 0.05. This indicates that there are significant differences between the test results before and after treatment. In other words, the treatment provided in this study had a statistically significant effect on improving the physical abilities of the research subjects.

1. Broad Jump: The results show a significant difference between pretest and posttest scores, indicating that the treatment improved leg muscle explosive power.
2. Sit Up: A significant difference was observed in sit-up performance before and after treatment, suggesting improved abdominal muscle strength.
3. Hand-Eye Coordination: The test results also showed a significant improvement, indicating enhanced hand-eye coordination after treatment.
4. Beep Test: When converted into numerical scores, the analysis showed a significant difference before and after treatment, meaning participants' aerobic capacity increased.
5. T-Test (Agility Test): The agility test completion time showed a significant improvement after treatment, indicating enhanced agility among participants.

3.4.1. Conclusion

There is a significant difference between pretest and posttest scores, indicating that circuit training has a significant effect on improving the fitness levels of basketball extracurricular students.

Overall, the results of this study demonstrate that the training program provided had a positive and significant impact on improving the respondents' physical abilities. All tested indicators—including leg muscle strength (Broad Jump), abdominal strength (Sit Up), hand-eye coordination (Hand-Eye), aerobic capacity (Beep Test), and agility (T-Test)—showed improvement after the treatment.

These findings are consistent with physical training theory, which states that regular exercise stimuli lead to physiological adaptations that enhance physical performance. The results also support previous studies indicating that exercise interventions can significantly improve various aspects of physical ability.

Therefore, this study provides valuable insights for basketball training methods at the beginner level, especially for students aged 13–15 years. The circuit training approach can serve as an effective alternative to improve overall physical fitness in basketball. Consequently, the research hypothesis stating that the treatment has a significant effect on improving physical ability is accepted.

4 CONCLUSION

In general, this study concludes that circuit training has a significant positive effect on students' learning outcomes and physical fitness. The findings show that circuit training conducted over 16 sessions resulted in a noticeable improvement in students' physical fitness and motor skills. Based on the analysis and discussion presented, it can be concluded that the circuit training method effectively enhances the physical performance

of students aged 13–15 years during the even semester of the 2024/2025 academic year at SMP Negeri 258 Jakarta.

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