

THE EFFECT OF INTERVAL TRAINING AND CIRCUIT TRAINING ON THE PHYSICAL FITNESS OF PRIMARY SCHOOL STUDENTS

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Abstract

Background: Primary school students are required to be able to participate in learning all the time which results in a lot of physical activity, causing fatigue and decreased fitness and psychic disturbances. Therefore, physical fitness has an important role that determines student learning productivity in school and factors in achieving learning goals. **Purpose of Study:** This study aims to determine the effect of interval training and circuit training to improve the physical fitness of Primary school students. **Materials and Methods:** used is a pseudo-experiment with a pretest-posttest design. Primary school students were sampled with 62 students covering both male and female genders. The division of groups is divided into 2 groups with ordinal pairing techniques. A measuring instrument to determine students' physical fitness using TKJI for ages 10-12. **Results:** Based on the data that has been analyzed resulted in a large increase in the group studied. The provision of interval training and circuit training treatment has a significant influence on improving physical fitness in Grade V students of Primary school students country 1 Tanjung Sari, Regency Lampung South. Physical fitness has improved after being given treatment interval training by being shown by a post-test value greater than the pre-test value. Interval training, which is the administration of weights on the body in a short but regular time and repeatedly interspersed with recovery that is like running interspersed with roads. **Conclusion:** showed that circuit training and interval training had an influence on the physical fitness of Primary school students. The difference between the two training programs seen from the t-test means that there are significant differences in physical fitness in Grade V students of Tanjung Sari State 1 Primary school, South Lampung Regency. Thus, from the average results of the two groups, it can be seen that circuit training has a better influence than interval training on physical fitness in Class V students of State 1 Tanjung Sari Primary school, South Lampung Regency.

Keywords: Circuit Training, Interval Training, Physical Fitness.

INTRODUCTION

Physical fitness is one of the components in human life that is indispensable, so that all daily activities can run well. Physical fitness can be obtained by doing physical activities regularly, measurably, and programmatically. A person who is not physically active can make health and the economy burdened, especially in developed countries [1]. Good physical fitness is the main capital for a person to do physical activity repeatedly for a relatively long time without causing significant fatigue [2]. Physical fitness is an indispensable condition to support daily activities [2]. With good physical fitness, a person is expected to be able to work productively and efficiently, not prone to disease.

Physical fitness has an important role that determines student learning productivity in school. Each individual's physical fitness has different levels depending on the daily activities or activities carried out. The benefits of physical fitness vary, one of which is that fitness for students can increase their willingness and ability to learn. A simple

example can be seen is if the physical is disturbed (sick), the student cannot carry out the duties and obligations as it should.

In school, students are directed to be able to follow lessons at any time, the level of physical fitness will affect daily activities because physical fitness is a benchmark in an activity. Some children in school experience lethargy and lack of enthusiasm in following lessons, it is caused by improper body, it is also found that some students are drowsy during morning class hours, this is possible because the students' physical fitness is still very low. Fitness can be a factor in achieving learning goals.

Physical activity is very important so that students have good physical fitness, thus students can do activities from morning to night well and not experience significant fatigue. At the level of children, physical activity still meets the criteria but activity will decrease as they get older [3]. With so many activities carried out psychologically also burdens students, if this continues to happen, over time the student's condition will decrease in physical fitness level and be prone to disease. when physical activity in children is inadequate it can result in an increased risk of diabetes and cardiovascular disease [3]. It can also have an impact on academic performance after poor cognition [4]. This can be avoided if there is a balance between academic activities, physical activities, and other activities that are well regulated. This can be overcome by suppressing physical activity which can reduce the risk of cardiometabolic caused by inactivity[5]. In fact, high physical activity can be said to be related to a better understanding of children and adolescents [4]. This is in line with the research conducted showing that high physical activity has more effect on cognitive than low intensity [6]. However, in another study, it is stated that the effects of physical activity on a child's cognitive are only limited [7]. At intervals of training carried out 2 times a week can have a positive impact on executive function in adolescents 15 years old [8].

Law Number 20 of 2003 concerning the National Education System, Article 3 states that the purpose of national education is to develop the potential of students to become human beings who have faith and piety in God Almighty, have a noble character, are healthy, knowledgeable, capable, creative, independent, and become democratic and responsible citizens. In the school environment, physical education, sports, and health are media to encourage physical growth, psychic development, motor skills, knowledge and reasoning, passion for values (behavioral, mental, emotional, sportsmanship, spiritual, social), as well as habituation of healthy biological patterns that boil down to stimulating the growth and development of balanced physical and psychic qualities in children in the school environment.

To overcome physical and mental fatigue, students can exercise in between routines and look for forms of physical activity that are easy in nature and do not require a long time. Interval training is a series of repeated physical exercise events interspersed with periods of recovery. Light physical exercise usually fills his recovery period.

Physical exercise can maintain body mass index (BMI) it can be said that if a person's body condition is fit then the possibility of developing a chronic disease can be avoided [9]. Physical exercise is very well done to maintain health as well as functional abilities [10]. Functional capability can be said to be the ability to perform daily physical activities. Interval training exercises have been suggested for alternatives

to physical activity that can improve health and fitness in children and adolescents [11][12]. Akan tetapi menurut [13] The intensity of interval training is not always good for physical activity, there are recent studies that interval training is very good when the heart rate reaches 85-95% which affects health and fitness.

Circuit training is a basic exercise in the form of a game that is carried out in a row from the first to the last movement through several posts. Circuit training is said to be complete, when an athlete has completed training at all stations according to the established dosage. According to [14] Of the two, interval training and circuit training can improve a person's fitness. This is the same as the results of the research conducted by [15] which results in interval training and circuit training affecting cardiorespiration fitness, strength, and balance. Circuit training is a series of exercises consisting of various groups that can make cardiorespiratory fitness and strength improved simultaneously [16], [17]. The research conducted also showed that circuit training has a positive impact on cardiorespiratory fitness, strength, body composition, balance and quality of life [18],[19],[20],[21],[22].

MATERIALS AND METHODS

In this study, the class V population at Primary school student's country 1 Tanjung Sari, Regency Lampung South, totaled 62 students. Then the sample used was all grade V students of Primary school student's country 1 Tanjung Sari, Regency Lampung South for the 2020/2021 School Year, totaling 62 students, namely 32 male students and 30 female students. The study was divided into two groups, the separation of samples was carried out by ordinal pairing. The results of rank 1 are placed in group A, the results of rank 2 and 3 are placed in group B, the results of rank 4 and 5 are placed in group A and so on until they run out. After 2 groups were formed, they were then drawn to determine what exercises would be distributed to the two groups among the 2 treatments to be given.

Data collection by making observations at Primary school students country 1 Tanjung Sari, Regency Lampung South. Samples were taken pre-test data to determine the level of physical fitness of students. The purpose of tkji is to measure the level of physical fitness based on predetermined tests, namely 40-meter sprinting, Hanging body lift, Sitting 30 seconds, Jumping upright and Running far 600 meters. The steps for implementing tkji are as follows:

1. Students are briefed on the implementation of the Pretest with the TKJI test for the age of 10-12 years starting from the procedure, procedures, test sequence, and provisions during the implementation of the test by the researcher.
2. Then the students do a fitness test with TKJI. The implementation of the TKJI test for ages 10-12 years is carried out by students in turn doing it.

The next step is to give treatment or exercise 3 times a week with a total of 16 meetings. About several times the frequency of exercise, it is stated that the frequency of exercise should be done at least three times a week [23]. Correspondingly according to [24] Exercise at a frequency of 3-4 times a week can increase VO₂max as well as a decrease in heart rate by fitness standards. The final step is the collection of postes data to find out the final capability of the sample after being given training. Data analysis techniques are carried out by conducting normality tests, homogeneity tests, hypothesis tests and influence tests.

RESULT

The results of the study were carried out to determine the impact of interval training and circuit training on the physical fitness of Class V students of Primary school students country 1 Tanjung Sari, Regency Lampung South, therefore an experiment was carried out to obtain a comparison of experimental group data (interval training and circuit training). Before data analysis using the following t-test, the following will be presented regarding the description of the research data which includes the mean (average), standard deviation, minimum value and and maximum value as described in the following table:

Table 1: Recapitulation of Physical Fitness Research Results

Group		Data			
		Average	Standard Deviation	Min	Max
Interval Training	pre test	13,26	3,17	9	22
	post test	14,74	3,50	10	24
Circuit Training	pre test	13,23	3,21	8	22
	post test	16,58	3,27	12	24

The initial test results for physical fitness of Class V students of Public Primary schools 1 Tanjung Sari, Lampung Selatan, the training interval group as shown in table 1 obtained an average physical fitness score of 13.26, standard deviation 3.17, the lowest score 9, and the highest score was 22. In the final physical fitness test, Class V students of Public Primary schools 1 Tanjung Sari, Lampung Selatan, the interval training group experienced a significant increase, namely the average physical fitness value was 14.74, the standard deviation was 3.50, the lowest score was 10, and the highest score was 24.

Meanwhile, the initial test results for physical fitness of Class V students of Public Primary schools 1 Tanjung Sari, Lampung Selatan, circuit training group as in table 12 obtained an average physical fitness score of 13.23, standard deviation 3.21, the lowest score 8, and the highest score was 22. In the final physical fitness test, Class V students of Public Primary schools 1 Tanjung Sari, Lampung Selatan, the circuit training group experienced a significant increase, namely the average physical fitness value was 16.58, the standard deviation was 3.27, the lowest score 12, and the highest score was 24. The comparison of the initial test and the final test of physical fitness of Class V students of Public Primary schools 1 Tanjung Sari, Lampung Selatan, the interval training and circuit training group can be described through the bar chart below:

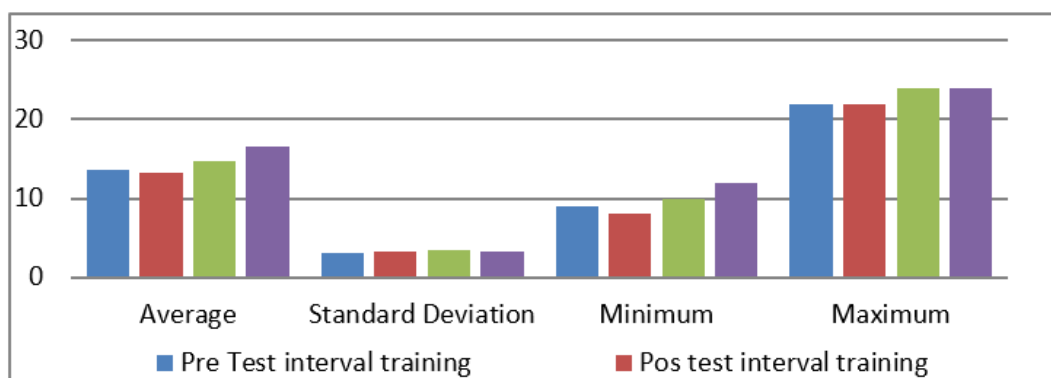


Figure 1: Comparison of Initial and Final Tests

Research Results in the Interval Training Group

Overview of the initial test and the final test of physical fitness level of Class V students of SD Negeri 1 Tanjung Sari Kabupaten Lampung Selatan, which has 62 students, based on the results of the study after being grouped and classified according to physical fitness test norms is described in the following table:

Tabel 2: Frequency Distribution on Initial Test and Final Test of Interval Training Group

Interval	Category	Frequency		Pesentase	
		PreTest	Posttest	PreTest	Posttest
22 – 25	Very Good	1	2	3,2%	6,5%
18 – 21	Good	3	5	9,7%	16,1%
14 – 17	Medium	9	12	29,0%	38,7%
10 – 13	Less	14	12	45,2%	38,7%
5 – 9	Less Than Once	4	-	12,9%	-
	Total	31	31	100%	100%

The table above shows the physical fitness level of Class V students of Public Primary schools 1 Tanjung Sari, Lampung Selatan, which amounted to 62 students in the initial test of the interval training group was as many as 1 student or 3.2% in the excellent category, as many as 3 students or 9.7% in the good category, 9 students or 29.0% in the medium category, 14 students or 45.2% in the less category and 4 students or 12.9% in the less category. While the level of physical fitness in the final test of the interval training group was as many as 2 students or 6.5% in the excellent category, as many as 5 students or 16.1% in the good category, 12 students or 38.7% in the medium category, 12 students or 38.7% in the less category and no students in the less category once. When displayed in the form of a bar chart, the percentage comparison of the initial test and the final test of the physical fitness level of the interval training group appears on the bar chart as follows:

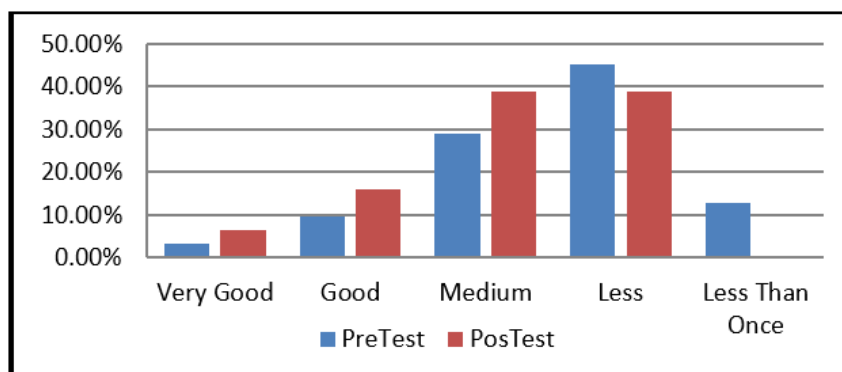


Figure 2: Comparison of Percentage of Initial Test and Final Test of Interval Training Group

Research Results in the Circuit Training Group

An overview of the initial test and the final test of the physical fitness level of Class V students of Public Primary schools 1 Tanjung Sari, Lampung Selatan, totaling 62 students, based on the results of the study after being grouped and classified according to the norms of the physical fitness test is described in the table as follows:

Tabel 3: Frequency on Initial Test and End Test of Circuit Training Group

Interval	Category	Frequency		Pesentase	
		PreTest	Posttest	PreTest	Posttest
22 – 25	Very Good	1	3	3,2%	9,7%
18 – 21	Good	3	9	9,7%	29,0%
14 – 17	Medium	8	13	25,8%	41,9%
10 – 13	Less	16	6	51,6%	19,4%
5 – 9	Less Than Once	3	-	9,7%	-
	Total	31	31	100%	100%

The table above shows the level of physical fitness of Class V students of Public Primary schools 1 Tanjung Sari, Lampung Selatan, totaling 62 students in the initial test of the circuit training group was 1 student or 3.2% in the excellent category, as many as 3 students or 9.7% in the good category, 8 students or 25.8% in the medium category, 16 students or 51.6% in the less category and 3 students or 9.7% in the less category.

Meanwhile, the level of physical fitness in the final test of the circuit training group was 3 students or 9.7% in the excellent category, as many as 9 students or 29.0% in the good category, 13 students or 41.9% in the medium category, 6 students or 19.4% in the less category and no students in the less category once. When displayed in the form of a bar chart, the percentage comparison of the initial test and the final test of the physical fitness level of the circuit training group appears on the bar chart as follows:

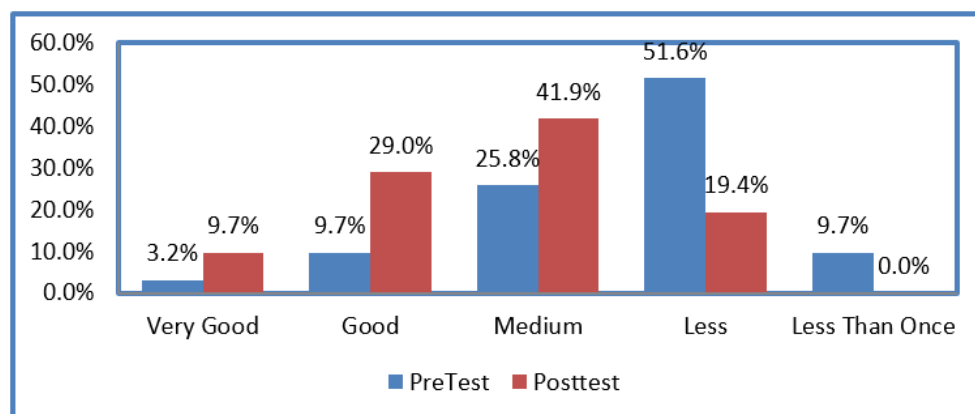


Figure 3: Comparison of Percentage of Initial Test and Final Test of Circuit Training Group

Prerequisite Test

In order to meet the analytical requirements in testing the research hypothesis, several steps of the requirement test will be carried out, including: data normality test and data variance homogeneity test. The results are as follows:

Normality Test

The purpose of the normality test is to find out whether or not the distribution occurs from the normal distribution. The steps before testing the hypothesis are first carried out to test the requirements for data analysis with a normality test, namely using the normality test results are as follows:

Tabel 4: Normality Test

No	Variable	L count	L table	Conclusion
1	PreTest Group Interval Training	0,117	0,159	Usual
2	PostTest Group Interval Training	0,155	0,159	Usual
3	PreTest Group Circuit Training	0,141	0,159	Usual
4	PostTest Group Circuit Training	0,119	0,159	Usual

The test criteria are

If L counts L_{table} , then the variable is normally distributed

whereas if L calculates L_{table} then the variable is abnormally distributed.

Homogeneity Test

A homogeneity test is carried out to obtain information on whether the two groups of samples have a homogeneous variance or not, As for the results of the homogeneity calculation, it is presented in the following table:

Tabel 5: Homogeneity Test

No	Data	F count	F table	Conclusion
1	PreTest Group Interval Training dan Circuit Training	1,025	1,841	Homogen
2	PostTest Group Interval Training dan Circuit Training	0,874	1,841	Homogen

To find out which variables have the same variance, the test carried out is by comparing the largest variance and the smallest variance of each group so that the Fhitung value is obtained with the test criteria if the $F_{hitung} < F_{table}$ value then both data are homogeneous or come from the same variance. It turned out that in the test results obtained $F_{hitung} < F_{table}$, the two variances were homogeneous.

Test the Hypothesis

Effect of Training Intervals On Physical Fitness in Grade V Students of Public Primary schools 1 Tanjung Sari, Lampung Selatan.

Test Criteria

H_0 accepted if $-t_{table} \leq t_{count} \leq t_{table}$

H_0 is rejected if $-t_{count} < -t_{table}$ or $t_{count} > t_{table}$

Conclusion:

Based on data analysis, a calculated value of 9.287 and a table t value $(n-1) = (31-1)$ with a two-way test, $\alpha = 0.05$ obtained a table t value = 2.042. Because $t_{count} = 9.287 > t_{table} = 2.042$ so it can be concluded that "There is a significant influence of training intervals on physical fitness in Grade V Students of Public Primary schools 1 Tanjung Sari, Lampung Selatan".

a. Effect of Circuit Training On Physical Fitness in Grade V Students of Public Primary schools 1 Tanjung Sari, Lampung Selatan

Test Criteria

H_0 accepted if $-t_{table} \leq t_{count} \leq t_{table}$

H_0 is rejected if $-t_{count} < -t_{table}$ or $t_{count} > t_{table}$

Conclusion:

Based on data analysis, a calculated value of 12.308 and a table t value $(n-1) = (31-1)$ with a two-way test, $\alpha = 0.05$ obtained a table t value = 2.042. Because $t \text{ count} = 12.308 > t \text{ table} = 2.042$ so it can be concluded that "There is a significant influence of the circuit training on physical fitness in Grade V students of Public Primary schools 1 Tanjung Sari, Lampung Selatan".

b. Differences in Final Tests Between Interval Training and Circuit Training Groups

Test Criteria

H_0 is accepted if $-t \text{ table} < t \text{ calculate} < t \text{ table}$ H_0 is rejected if $-t \text{ calculate} < -t \text{ table}$ or $t \text{ count} > t \text{ table}$

Conclusion:

Based on the results of data analysis, the calculated t value is 2.135. The t distribution table is sought at $\alpha = 5\% : 2 = 2.5\%$ (2-sided test) with a degree of freedom (df) $n-2$ or $62-2 = 60$. With a 2-sided test (significance = 0.025) results were obtained for t table of 2,000. Because the t value counts $2,135 > t \text{ table} 2,000$, it means that in the final test there is a difference in physical fitness in Grade V students of Public Primary schools 1 Tanjung Sari, Lampung Selatan which is significant between the interval training and circuit training groups. Meanwhile, when viewed from the average improvement and final test of the two groups, it can be seen that the circuit training group has a greater increase and the final test compared to the interval training group so it can be concluded that "Circuit training has a significant effect on physical fitness in Grade V students of Public Primary schools 1 Tanjung Sari, Lampung Selatan".

DISCUSSION

Based on the data that has been analyzed resulted in a large increase in the group studied. The provision of interval training and circuit training treatment has a significant influence on improving physical fitness in Grade V students of Primary school students country 1 Tanjung Sari, Regency Lampung South.

Physical fitness has improved after being given treatment interval training by being shown by a post-test value greater than the pre-test value. Interval training, which is the administration of weights on the body in a short but regular time and repeatedly interspersed with recovery that is like running interspersed with roads. Agree with the results [25] interval training has a more significant effect than circuit training in increasing speed, agility and power of the limb muscles. According to [26] also said that interval training and circuit training also have an effect but not too significant. According to [27] Interval training can be a positive change of various somatic, functional and motor indicators.

Interval training is a form of training interspersed with intervals in the form of rest periods. This is also emphasized by [28] Interval training is one of the ways that can be used to improve fitness and increase anaerobic tolerance greater than traditional exercise exercise models without increasing the risk. The most influential and very instrumental organ system in the body in interval training is the cardiorespiratory system. [29] Circuit training can improve physical fitness. Circuit training is an efficient exercise tool to help reduce body fat, increase insulin sensitivity and improve $VO_{2\max}$ and muscle fitness [30].

Oxygen consumption and pulmonary phenylation increased about 20 times on physical activity training with intensity. After conducting research starting from the initial data collection to the data processor which was finally used as a benchmark as a discussion of the research results as follows: the effect of interval training exercise (X) on physical fitness in Grade V students of Primary school students country 1 Tanjung Sari, Regency Lampung South (Y) showed that both variables had a big influence. In getting training goals, a good training program from a coach is needed. Thus a success can be obtained from the application of the principles of exercise needed in making an exercise program, one of which is interval training.

Meanwhile, in the circuit training group based on analysis and data studies, it was concluded that there was a great influence of circuit training on physical fitness in Grade V students of Primary school students country 1 Tanjung Sari, Regency Lampung South. Circuit training is an exercise that combines elements of physical condition as a whole to improve the components of physical condition carried out in an open or closed field and consists of posts where each post performs a different type of exercise.

From the data above, it can also be described that circuit training training has a greater improvement compared to interval training, this is caused because the interval training group performs exercises with rest or recovery time in each set while in the circuit training group the rest or recovery time is carried out at the time of movement from post to post.

CONCLUSIONS

Based on discussions based on studies, it was concluded that there is an influence on interval training training on physical fitness. Then there is the influence of circuit training training on physical fitness, therefore it is said that circuit training is more influential on physical fitness in Grade V students of Primary school students country 1 Tanjung Sari, Regency Lampung South.

Based on the research carried out to find solutions in solving problems, we hope that we can continuously improve the research in conducting further research, with some improvements, for example:

- a) A larger number of research samples;
- b) Longer research time;
- c) Add free variables as a comparison.

Then interval training and circuit training can be used as an exercise program to improve physical fitness. As well as circuit training training is more recommended to be used as an exercise program in improving the components of physical condition or physical fitness because it has a greater percentage increase than interval training exercises.

Disclosure Statement

No author has any financial interest or received any financial benefit from this research.

Conflict of Interest

The authors state no conflict of interest.

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