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THE DIFFERENCES OF THE EFFECT OF EXERCISE METHODS AND LIMB MUSCLE POWER ON THE ABILITY OF 100 METERS SPRINT

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Abstract

The aims of this study were to determine: (1) whether or not there were the differences of the effect of drill training versus game training on the ability of seventh grade female students of SMPIT Darussalam Tanon Sragen in the 2020/2021 school year. (2) Whether or not there were differences of the ability to run 100 meters sprint in female students of class VII SMP IT Darussalam Tanon Sragen in the 2020/2021 school year between students with high leg muscle power and students with low leg muscle power. (3) Whether or not there was an interaction between exercise methode and leg muscle power on the ability of class VII female SMPIT Darussalam Tanon Sragen students to have 100 meters sprint in the 2020/2021 school year.

This study employed a 2 X 2 factorial design experimental method. The population and sample in this study were 60 female students in grade VII SMP IT Darussalam Tanon Sragen for the academic year 2020/2021. The results of the leg muscle power test were used to group the research samples. The test results of leg muscle power were classified into three categories: high leg muscle power, moderate leg muscle power, and low leg muscle power. The samples used were 20 people with high leg muscle power criteria and 20 people with low leg muscle power criteria, with the moderate leg muscle power criteria omitted. Data was collected using leg muscle power tests, specifically the standing broad jump test and the 100-meter sprint test. The data was analyzed using 2 X 2 ANOVA, then Newman-Keuls.

The findings show: (1) there is a significant difference of the effect of the drill training methods and the game training method on the ability to have 100 meters sprint in class VII female students of SMPIT Darussalam Tanon Sragen in the academic year 2020/2021. The data analysis shows Fo = 6.817 > Ftable 5% 5% 4.11. (2) There is a significant difference in the ability to have 100 meters sprint between students with high leg muscle power and students with low leg muscle power in female students of class VII SMP IT Darussalam Tanon Sragen in the 2020/2021 school year. (3) There is an interaction between exercise methode and leg muscle power on the ability to have 100 meters sprint in class VII female students of SMPIT Darussalam Tanon Sragen in the 2020/2021 school year. The results of data analysis shows that Fcount = 4.868 > Ftable 5% = 4.11. The level of leg muscle power possessed by female students of class VII SMP IT Darussalam Tanon Sragen in the 2020/2021 academic year has an effect on the 100-meter sprint exercise.

Keywords: Exercise Method, Leg Muscle Power, 100 Meters sprint

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INTRODUCTION

Education is an essential component of any country. It will be able to see the extent of a country's development and progress through this education. In relation to education in Indonesia, it is stated in Law Number 20 of 2003 concerning the National Education System in article 1 that education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character, and skills needed by themselves, the community, and develop all their potentities. Students are guided through the learning process.

According to the law, there is a lot of potential that must be developed through education so that students have religious spiritual strength, self-control, personality, intelligence, noble character, and the skills required by themselves, the community, and develop all the potential possessed by students through the learning process.

Physical Education, Sports, and Health is one of the subjects that plays an important role in helping students develop their potential. "Physical education is part of overall education that prioritizes physical activity and fostering a healthy life for harmonious, harmonious, and balanced physical, mental, social, and emotional growth and development," writes Kristiyandaru in the Journal of Sports and Health Education (2015: 834). Those are characteristics that set them apart from other subjects
Physical education is a component of overall education that is implemented through physical activity. Physical education learning that is done properly and on a regular basis can help students achieve their learning goals more effectively. According to Yi Ching Huang in the Journal of Physical Education and Sports (2013: 194), "So far, physical education is still considered unimportant by some parents, when in fact Physical Education and academic achievement complement each other, and adequate physical activity can not only improve the mental and physical health of students but can improve students' learning abilities."

According to the Journal of S.P.O.R.T. (2019: 2), "one of the supporting factors for athletes to achieve maximum speed is that an athlete must have a good running technique." Continuous training can lead to the development of a good running technique. One of the most important factors in achieving maximum running speed is mastering the sprint method. A start technique, a sprint technique, and a finish technique comprise the sprint method. Practicing the sprint method necessitates the proper training method, so that print methods are well mastered and can better support short-distance running abilities. One of the most important factors to consider when practicing print method is repetition. Andi Suhendro (2007: 3.6) states, “Exercise must be done repeatedly.

Drilling can be used to train the method of sprint, which is done repeatedly (exercise). "The drill or training technique is a good way of teaching or training to instill certain habits," writes Syaiful Sagala (2015: 217). The game training technique can be used to train the technique of sprint (play). Ghosh (2015: 5) states that "the method of playing (game) according to is a way of applying various teaching methods that are adapted to the characteristics of students and the characteristics of the teaching itself, so that the method is suitable to be applied."

Drill and game training are two training methods that can be used to improve sprint techniques. Because the two training techniques have different characteristics, each with different strengths and weaknesses, it is unknown which training method has a greater effect on increasing the ability to run 100 meters in a short amount of time. Because the ability to have a 100 meters sprint is influenced by factors other than the training method used in the exercise, such as physical, anthropometric, technical, mental abilities, and so on.

Leg muscle power is one component of physical fitness that plays an important role in supporting the ability to run short distances. Leg muscle power is important when running short distances, especially at the beginning.

Based on this, a problem arises that needs to be studied and researched, because the drill training method and game training method are not yet known for their effect on increasing the ability to run 100 meters sprint. In addition, whether or not the leg muscle power is good or not, its effect on the ability to run a short distance of 100 meters is unknown. To know this, it is necessary to study and research in more depth both theoretically and practically through experimental research.

Sprint exercises using drill training and game training methods will be tested with female students in grade VII at SMPIT Darussalam Tanon Sragen during the 2020/2021 school year. This study was carried out on female students in class VII of SMPIT Darussalam Tanon Sragen during the 2020/2021 academic year, because their ability to run short distances needs to be improved. The short-distance running material for female students of class VII SMPIT Darussalam Tanon Sragen in the 2020/2021 school year has not yielded the best results in physical education learning. This can be seen at the time of starting and when running is not done optimally. The speed is only achieved at a distance of 20-30 meters, while the rest of the other distances the running speed decreases. The weaknesses of the seventh grade female students of SMPIT Darussalam Tanon Sragen in the 2020/2021 academic year in learning to have sprint need to be explored whether the causal factors are not optimal in sprint training or their physical condition is not good, especially leg muscle power. Because so far there has never been a test and measurement of the ability of physical conditions, especially leg muscle power with the ability to have 100 meters sprint.

Based on what has been described, the aim of the research is to determine whether there is a difference of the effect of drill training methods and game training methods on the 100-meter sprint ability of female students in class VII of SMPIT Darussalam Tanon Sragen in the 2020/2021 school year. (2) Whether or not there is a difference in the ability to run 100 meters sprint between students with high leg muscle power and students with low leg muscle power in seventh grade female SMPIT Darussalam Tanon Sragen students in the 2020/2021 school year. (3) whether or not there is an interaction between exercise methods and leg muscle power on the ability to run 100 meters sprint in class VII female students of SMPIT Darussalam Tanon Sragen in the 2020/2021 school year.

METHODS

The research was conducted at the sports field of SMPIT Darussalam Tanon Sragen, which is located at Jalan Tanon - Mondokan - Sukodono Buduran, Kalikobok, Tanon District, Sragen Regency, Central Java 57277. The research took one and a half months. The study lasted from December 2019 to January 2021, with three exercises per week. The experimental method was used in this study. The research design used was a factorial 2 X 2 design. The population and sample in this study were 60 female students in grade VII SMP IT Darussalam Tanon Sragen for the 2020/2021 academic year, divided into three (3) classes.

Purposive sampling was used as a research sampling technique. Based on the classification of leg muscle power, the sample size for this study was 40 people. A leg muscle power test, namely the standing broad jump test, is used to classify leg muscle power. The entire population was tested for leg muscle power, and the results were divided into three categories: high leg muscle power, moderate leg muscle power, and low leg muscle power. The sample consisted of 20 students with high leg muscle power and 20 students with low leg muscle power. The category of moderate leg muscle power was omitted because the attributive variables used in the ANOVA 2 X 2 research design were high leg muscle power and low leg muscle power. Furthermore, the 40 students who were chosen as samples were divided into four groups using a two-by-two factorial design.

Hypothesis

Hipotesis 1 $H_0 = \mu \ \ A_1 \geq \mu \ \ A_2$

$H_A = \mu \ \ A_1 < \mu \ \ A_2$

Hipotesa 2 $H_0 = \mu \ \ B_1 \geq \mu \ \ B_2$

$H_A = \mu \ \ B_1 < \mu \ \ B_2$

Hipotesa 3 $H_0 = Interaksi \quad A \times B = 0$

$H_A = Interaksi \quad A \times B \neq 0$

Description

m = Average value
A1 = Drill practice method
A2 = Game practice method
B1 = High leg muscle power
B2 = low leg muscle power

DISCUSSION

The description of the results of data analysis of drill training methods and game training methods on the ability to run 100 meters sprint for female students of class VII SMPIT Darussalam Tanon Sragen in the 2020/2021 school year according to the compared groups, is presented in the form of a table as follows:

Exercise Method	Limb Muscle Power	Statistics	Pre-Test	Post-Test	Improvement
Drill (A1)	High B1)	Total	166.38	164.34	2.04
		Mean	16.64	16.43	0.21
		SD	1.14	1.17	0.15
	Low (B2)	Total	167.39	166.66	0.73
		Mean	16.74	16.67	0.07
		SD	0.91	0.89	0.05
Game (A2)	High (B1)	Total	169.53	168.90	0.63
		Mean	16.95	16.89	0.06
		SD	1.09	1.07	0.05
	Low (B2)	Total	174.72	174.20	0.52
		Mean	17.47	17.42	0.05
		SD	0.97	0.97	0.04

Table 1. Summary of Descriptive Statistical Figures of 100-meter Sprint Ability Data for Class VII Female Students at SMPIT Darussalam Tanon Sragen for the 2020/2021 Academic Year

If the groups of students who received the drill training method and the game training method were compared, it can be seen that the drill training method group had a better effect on the ability to run 100 meters sprint than the game training method group with a difference of 0.08. If the group of students who have high leg muscle power and students who have low leg muscle power are compared, it can be seen that the group of students who have high leg muscle power have better ability to run 100 meters sprint than students who have high leg muscle power have low leg muscle power with a difference of 0.07 difference.

Reliability Test

The reliability test in this research is the pre-test and the post-test of the ability to run 100 meters sprint. The results of the reliability test of this study are presented in the form of a table as follows:

Test Results	Reliabilitas	Category
Pre-test of 100m sprint Post-test of 100m sprint	0,975 0.972	Very High Very Low

Table 2. Summary of Data Reliability on Pre-Test and Post-Test of 100 Meters Sprint Ability

Testing Requirements Analysis

Normality test

Before analyzing the data, it is necessary to test its normality distribution. The normality test of the data in this study used the Lilliefors method. The normality test resulted in Lo < Lt. This shows that the sample taken comes from a population that is normally distributed. Thus the data normality test requirements have been met.

Homogeneity Test

With the same data, after being analyzed using the Bartlet test, the results of the homogeneity test are obtained as shown in the following table: Table 8. Results of Homogeneity Test with Bartlet's Test.

å Group	**N_i**	**S^2**	**X^2_{hit}**	**X^2_{table}**	**Conclusion**
4	10	0.707	4.358	7.81	Homogenity

According to the homogeneity test data, X2hit is smaller than X2table. This demonstrates the homogeneity of the research sample. As a result, the requirement for homogeneity is also met. The appendix contains details and procedures for analyzing the homogeneity of variance tests.

Hypothesis test

First Hypothesis Testing

According to the study's findings, there was a significant difference in the ability to run 100 meters sprint in class VII female students of SMPIT Darussalam Tanon Sragen in the 2020/2021 school year using the drill training method and the game training method. According to the results of the calculations, F0 = 6.817 is greater than Ft = 4.11 (F0 > Ft) at a 5% significance level. That is, the null hypothesis (H0) is rejected. These findings show that the drill training method and the game training method have a significant difference in the ability to run 100 meters sprint.

Second Hypothesis Testing

The results of this study revealed a significant difference in the ability to run 100 meters sprint by female students of class VII SMP IT Darussalam Tanon Sragen in the 2020/2021 academic year based on the level of leg muscle power possessed by these students. According to the results of the calculations, F0 = 8.872 is greater than Ft = 4.11 (F0 > Ft) at a 5% significance level. That is, the null hypothesis (H0) is rejected. These findings show that there is a significant difference in the ability to run a sprint of 100 meters between people with high and low leg muscle power.

Third Hypothesis Testing

In the 2020/2021 academic year, the interaction of the main research factors in the form of a two-factor interaction revealed that there was an interaction between the exercise method and leg muscle power on the ability to run 100 meters sprint in class VII female students of SMPIT Darussalam Tanon Sragen. At a significance level of 5%, the value of F0 = 4.868 was greater than Ft = 4.11 (F0 > F percent), indicating that H0 was accepted. As a result, it is possible to conclude that the exercise method and leg muscle power interact with the ability to run 100 meters sprint.

I. The Differences of Effect of Drill Practice Method and Game Practice Method on 100 Meters Sprint Ability

Based on the results of calculations that have been carried out, the Fo value is 6.817 > Ftable 5% 4.11. With the difference in the difference increased by 0.08. Based on these results, it shows that there is a significant difference in the effect of the drill training method and the game training method on the ability to run 100 meters sprint in class VII female students of SMPIT Darussalam Tanon Sragen in the 2020/2021 school year.

II. Differences in the ability to run 100-meter sprints between students with high leg muscle power and students with low leg muscle power

According to the second hypothesis testing, there is a significant difference in the ability to run 100 meters sprint in female students of class VII SMPIT Darussalam Tanon Sragen in the 2020/2021 academic year between students who have high leg muscle power and students who have low leg muscle power.

According to the study's findings, students with high leg muscle power have a better ability to run 100 meters sprint than students with low leg muscle power. This is because students with strong leg muscles can exert the correct technique to its fullest. Leg muscle power is used to the fullest, especially after hearing the "yes" signal and placing one's foot on the starting beam. A high initial speed will be obtained with maximum leg muscle power at the start. Furthermore, when sprinting to the finish line, leg muscle power is activated. When running, the leg muscles are used to their fullest extent in both the right and left legs. By exerting maximum leg muscle power when running, maximum running speed will be obtained. While students who have low leg muscle power, the movement when starting the speed is not optimal. The thrust forward looks weak, so it doesn't have a maximum initial speed. In addition, when running, the speed of movement is also less than optimal, because the leg muscles are not maximal in exerting their strength and speed of movement.

According to the results of the calculations, the value of Fo 8.872 > Ftable 5% is 4.11. With a difference of 0.07, the difference grows. Based on these findings, there is a significant difference in the ability to run 100 meters sprint in female students of class VII SMPIT Darussalam Tanon Sragen in the 2020/2021 academic year between students with high leg muscle power and students with low leg muscle power.

III. Interaction between Exercise Methods and Power of Limb Muscles on the Ability to Run 100 Meters sprinT

The exercise method and leg muscle power interact with one another. These findings suggest that when using the sprint training method, the level of high leg muscle power and low leg muscle power must be considered. This is because the interaction between sprint training methods and leg muscle power is distinct. Students with strong leg muscles are better suited to the game training method. Meanwhile, students with low leg muscle power are better suited to the drill training method. This is because, in the drill training method, students must perform sprint technique movements based on the examples they see, so that the involvement of leg muscle power is not very high. Students can demonstrate the sprint technique slowly with the level of leg muscle power they have. While the game training method in sprint exercises demands a high level of leg muscle power. Because when carrying out a sprint game, it must be done at maximum speed, so it requires high leg muscle power. With a high level of leg muscle power, sprint games can be performed at maximum speed. On the other hand, if the sprint game is not matched by high leg muscle power, then the sprint game cannot be performed at maximum speed.

Based on the results of the calculations that have been carried out, the value of Fo is 4.868 > Ftable 5% 4.11. Based on these results, it shows that there is an interaction between exercise methods and leg muscle power on the ability to run 100 meters short distance in class VII female students of SMPIT Darussalam Tanon Sragen in the 2020/2021 academic year.

CONCLUSION

Based on the data analysis and discussion that has been disclosed in CHAPTER IV, the following conclusions can be drawn.

1. There is a significant difference in the effect of the drill training method and the game training method on the ability to run 100 meters sprint in class VII female students of SMPIT Darussalam Tanon Sragen in the 2020/2021 school year. From the results of data analysis shows Fo = 6.817 > Ftable 5% 5% 4.11.
2. There is a significant difference in the ability to run 100 meters sprint between students who have high leg muscle power and students who have low leg muscle power in female students of class VII SMP IT Darussalam Tanon Sragen in the 2020/2021 school year. From the results of data analysis shows Fo = 8.872 > Ftable 5% 5% 4.11.
3. There is an interaction between exercise methods and leg muscle power on the ability to run 100 meters sprint in class VII female students of SMPIT Darussalam Tanon Sragen in the 2020/2021 school year. The results of data analysis shows that Fcount = 4.868 > Ftable 5% = 4.11. The level of leg muscle power possessed by female students

of class VII SMP IT Darussalam Tanon Sragen in the 2020/2021 academic year has an effect on the 100-meter sprint exercise.

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