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The Effect Of Ladder Drill Training On Movement Mobility Of 14–16 Year-Old Tennis Athletes At Ace Tennis Club Lampung

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Abstract

This study aims to determine the effect of ladder drill training on field tennis mobility in athletes aged 14-16 years in Bandar Lampung. The research method used in this study is an experiment with the aim of knowing whether there is an effect of the results of the study on the problem under study. The sample of this study was field tennis athletes aged 14-16 years in Bandar Lampung totaling 20 athletes. The sampling technique uses ordinal pairing with the division of 2 groups, namely the experimental group and the control group. The instrument used the field tennis mobility test from the International Tennis Federation Book. The results showed that there was a significant effect of ladder drill training on tennis mobility in athletes aged 14-16 years in Bandar Lampung with a value of tcount = 5.230> ttable = 2.262. This means that ladder drill is an effective method to train jumping skills, both with one foot and two feet, by jumping over a ladder-shaped rope placed on the floor or ground. The results of the comparison with the control group obtained a value of tcount = 3.866> ttable = 2.101, meaning that there is a significant comparison of tennis mobility between the experimental and control groups. Translated with DeepL.com (free version).

Keywords: *Ladder Drill, Mobility, Tennis Court*

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INTRODUCTION

Sport comes from two syllables, namely olah and raga, which means cooking or manipulating the body with the aim of making the body mature. Sport is one form of effort to improve physical quality directed at the formation of character, personality, discipline and high sportsmanship, as well as increasing achievements that can develop a sense of national pride. Sport is essentially a large muscle activity that uses certain energy to improve the quality of life. This can be interpreted that sport is a more complex and structured activity than a game. Sport is another form of physical activity but is much more structured than training, because sports have a set of rules and generally involve competition. Sport has an important role in increasing the

dignity and honor of the nation and one of the sports that can be achieved is tennis. Tennis is a sport that is increasingly popular among the community, both teenagers, adults, and the elderly.

Through tennis activities, teenagers gain many benefits, especially in physical, mental, and social growth. Tennis is a sport that can be played between 2 players (singles) or 2 pairs (doubles). Each player uses a racket to hit the ball. The goal of this game is to get points by hitting the ball in all directions specified in the rules, so that the opponent cannot reach the ball and a point is scored. The basic techniques and strokes in playing tennis include forehand, backhand, groundstrokes, volleys, serve, smash, and other types of strokes for high-level players. Prasetiono & Gandasari, (2018) Tennis can be played by everyone from adults, teenagers, children, to the elderly. Achievement sports have high competitive competition so that athletes are encouraged to improve their abilities and continue to practice. To improve achievements, many competitions have been held regularly in each region. The matches are held from regional, provincial, national, and even international levels. Dian Mawarda, (2021).

To improve agility and speed in playing tennis, a suitable form of training is needed so that it can improve well, a suitable form of training is ladder drill training. Ladder drill training is the best way to improve speed, agility, coordination and balance. Kusminto et al., (2019). The influence factor of ladder drill training is able to provide changes in a person's leg muscle power, the leg muscles continuously contract so that the aspects of jumping and running movements become one of the significant agility exercises. So it is hoped that with an approach to the form of ladder drill training, players can obtain better agility and dexterity, speed and mastery.

The results of initial observations in the field (direct observation) on tennis athletes aged 14-16 years which coincided with the physical training activities of tennis athletes using test items namely; tennis mobility, found that the average value obtained by tennis athletes aged 14-16 was in the low category, namely; 61 seconds. This is certainly a problem and also a research gap. Therefore, researchers are interested in analyzing the Effect of Ladder Drill Training on Tennis Mobility of Athletes Aged 14-16 Years in Bandar Lampung.

METHOD

This research method uses an experimental method with the aim of determining whether there is an influence of the study results on the problem being studied. The comparative experimental method is a form of variable analysis (data) to determine the difference between two or more groups of data (variables) which aims to determine the effect of an independent

variable on the dependent variable by manipulating the independent variable to see the effect of the dependent variable. The quantitative approach is considered the strongest in studying various existing symptoms, especially related to the relationship of the influence of a factor or variable on other factors or variables. In this study, the magnitude of the influence of the independent variable (treatment) of the ladder drill training method (y) on tennis court mobility skills will be described. The treatment was carried out for 16 meetings. Treatment will be given 3 times a week.

Based on the research method, the researcher used an experimental method. An experiment is a way to find a causal relationship between two factors that are intentionally created by the researcher by eliminating or reducing or setting aside other interfering factors (Suharsimi Arikunto 2020). In the experimental research design, observations were conducted twice, namely before the experiment called the pre-test, and observations after the post-test experiment. In this case, the factor being tested was tennis field mobility training using the ladder drill training method on athletes aged 14-16 years in Bandar Lampung. To determine the effect of ladder drill training on improving tennis field mobility abilities in athletes aged 14-16 years in Bandar Lampung.

From a population of 20, 100% was taken, resulting in 20 tennis athletes aged 14-16 years in Bandar Lampung. Regarding the sufficient sample size for the population, if the subjects are less than 100, it is better to take all of them so that the research is a population study. Because tennis athletes are no more than 100 people, this study is a population study, and the sample of this study is 20 tennis athletes aged 14-16 years in Bandar Lampung.

The research design used in this study was a pre-test-post-test design. This design includes a pre-test before treatment is administered, thus allowing for more accurate results, as it allows for comparison between the results before and after treatment..

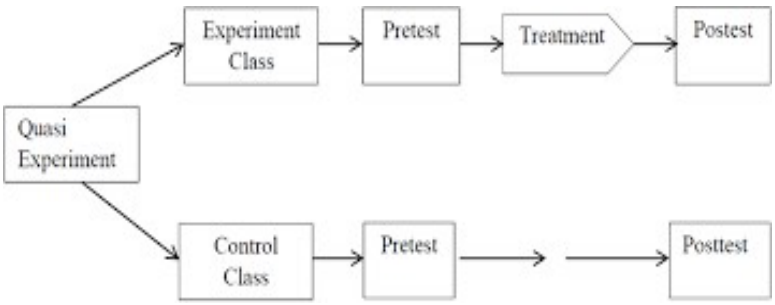

Figure 1. Research Design
(Source: Ahyar et al., 2020)

A research variable is anything in any form determined by the researcher to be studied to obtain information about it. In this study, two variables will be proposed: the independent variable and the dependent variable. The independent variable is the variable that influences or causes changes or the emergence of the dependent variable. The independent variable in this study is the agility ladder training method. In Indonesian, it is often called the dependent variable. "The dependent variable is a variable that influences or becomes a consequence, due to the presence of the independent variable" (Sugiyono, 2015). The dependent variable in this study is tennis court mobility.

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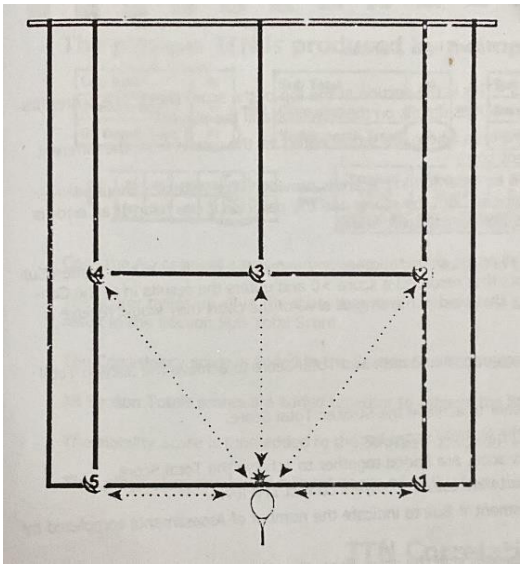

Figure 2. Research Instrument
(ITF Book, International Tennis Federation)

This test is conducted on a tennis court, this test is very simple but produces a fairly accurate estimate of the agility of athletes aged 14-16 years for various uses or purposes. Data collection in this study used a preliminary test and a final test, the preliminary test is a test conducted before training using ladder drills and will be conducted a tennis court mobility test after conducting the test. The training program using agile ladders has 4 types of training models, namely: two feat lateral run, easy shuffle, ladder steps, and lateral in out. This test is used to determine speed with changes in direction, such as sprinting left and right. Basically, this test is direct: the testee stands in the middle of the field then runs to point 1 where the ball has been given then collects the ball at the starting point, does the movement until points 2, 3, 4 and 5 until all the balls are collected at the starting point. Do the test at maximum speed and get a good score. This test can show the level of training using ladder drills to the maximum. The number of meetings in this study was 16 meetings, this is in accordance with the opinion (Bompa & Buzzichellu, 2015) regarding the duration of training that "in carrying out training to be able to change physical conditions in this case agility, the number of training sessions is between 16 and 24 meetings."

Data analysis techniques aim to improve analysis. The data analyzed are the results of the initial test (pre-test) and the final test (post-test). Calculating the results of the initial test (pre-test) and the final test (post-test) using the t-test data analysis technique. The requirements for using the t-test are:

1. Normality Test

This is used to determine the type of statistic to be used in the difference test. To test for data normality, a normality test known as the Lilliefors test is used. If Lcount > Ltable, the data is normally distributed; otherwise, the data is not normally distributed.

2. Homogeneity Test

The homogeneity test is used to determine whether the data have the same variance (homogeneity).

$$f\ hitung = \frac{Varians\ Terbesar}{Varians\ Terkecil}$$

This homogeneity test shows that if the calculated F is smaller (<) than the F table, then the data has a homogeneous variance. However, if the calculated F is (>) from the F table, then the two groups have different variances.

3. Hypothesis Testing

The test researchers use to test hypotheses is the t-test. The t-test is used to compare the means of two unrelated groups.

$$t\ hitung = \frac{X1 - X2}{\sqrt{\frac{(n1 - 1)s_{1^2} + (n2 - 1)s_{2^2}}{n1 + n2 - 2}}\left(\frac{1}{n1} + \frac{1}{n2}\right)}$$

Description:

X1 = Mean Score I

X2 = Mean Score II

n1 = Number of Sample Data I

n2 = Number of Sample Data II

S1² = Variance of Sample I

S22 = Variance of Sample II

RESULTS AND DISCUSSION

Result

The sample in this study consisted of 20 tennis players aged 14-16 in Bandar Lampung. The results of the study, which included pretests and posttests on tennis mobility tests, after they underwent ladder drills using various models: two-foot lateral runs, licky shuffles, ladder taps, and lateral in-out, are described as follows:

1) Experimental Group

Table 1. Results of the Experimental Group Mobility Test

Statistics	Values	
	Pretest	***Posttest***
Mean	35,80	24,50
Standard Deviation	7,361	7,352
Variance	54,178	54,056
Minimum	47	42
Maximum	25	15

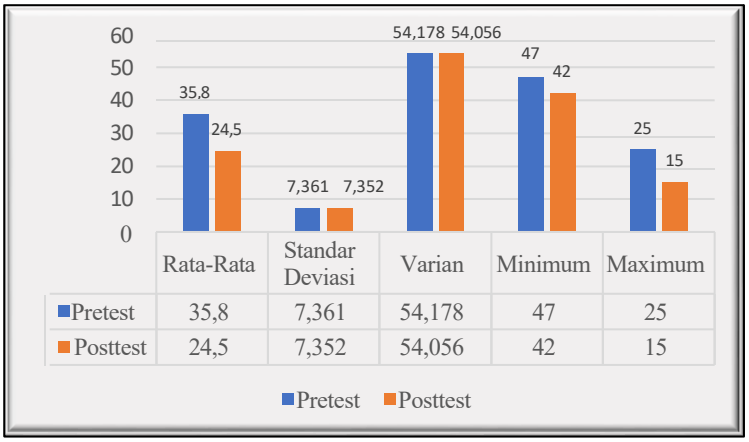

Figure 3. Comparison Diagram of Pretest and Posttest of Experimental Group

Based on the diagram, the experimental group demonstrated better overall posttest results. This is evident from the average, minimum, and maximum scores, and the stability of the standard deviation. The following illustrates the pretest and posttest conducted to measure tennis mobility in tennis athletes aged 14-16 in the experimental group, which consisted of 10 athletes performing ladder drills. Based on the research results, the data has been grouped and classified according to mobility test norms and can be presented in the following table:

Table 2. Experimental Group Tennis Mobility Categories

Category	Interval	Frequency	
		Pretest	***Posttest***
Very Good	< 15	0	0
Good	16 – 29	1	7
Fair	26 – 37	4	2
Poor	38 – 49	5	1
Very Poor	> 50	0	0

2) Control Group

Table 3. Results of the Mobility Test for the Control Group

Statistic	Value	
	Pretest	***Posttest***
Mean	35,30	38,60
Standard Deviation	7,394	7,749
Variance	54,678	64,044
Minimum	45	49
Maximum	25	28

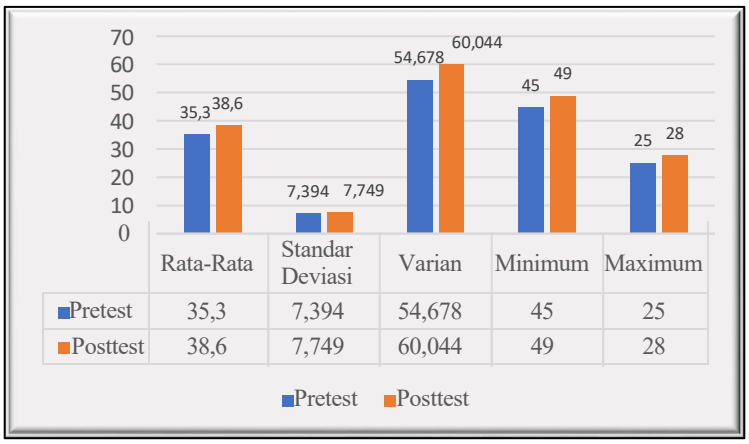

Figure 4. Pretest and Posttest Comparison Diagram

Control GroupBased on the diagram, the experimental group demonstrated better overall pretest results. This is evident from the average, minimum, and maximum scores, as well as the stability of the standard deviation.

The following is an overview of the initial and final tests conducted to measure tennis mobility in tennis athletes aged 14-16 years in a control group consisting of 10 athletes without any treatment. Based on the research results, the data has been grouped and classified according to mobility test norms and can be presented in the following table:

Table 4. Control Group Tennis Mobility Categories

Category	**Interval**	**Frekuensi**	
		Pretest	***Posttest***
Very Good	< 15	0	0
Good	16 – 29	1	0
Fair	26 – 37	5	5
Poor	38 – 49	4	5
Very Poor	> 50	0	0

Prerequisite Test Results

1. Normality Test

Table 5. Normality Test for Experimental and Control Groups

Grup	Test	Tennis Mobility		Conclusion
		L_{count}	L_{table}	
Experiment	*Pretest*	0,122	0,258	Normal
	Posttest	0,256	0,271	Normal
Control	*Pretest*	0,146	0,285	Normal
	Postest	0,179	0,258	Normal

From the four variables above, tennis mobility is obtained Lcount < Ltable, so all variables are normally distributed, and can be continued with other prerequisite tests, namely the homogeneity test.

2. Homogeneity Test

Table 6. Homogeneity Test

Variable	F_{count}	F_{table}	Conclusion
Pretest of the experimental and control groups	1,009	3,179	Homogen
Posttest of the experimental and control groups	1,111	3,179	Homogen

From the two variables above, tennis mobility obtained Fcount < Ftable, indicating that all variables have the same variance and can be used to test their influence (t-test).

Hypothesis Test Results

1) Experimental Group

Table 7. Experimental Group Influence Test

Variable	Mean		Tcount	Ttable	Sig	Conclusion
Experimental Group	Pretest	35,80	5,230	2,262	0,001	There is a significant influence
	Postest	24,50				

Based on the t-table value (n-1) = (10 - 1) = 9, with a 2-tailed test, a = 0.05, the t-table value was 2.262. Therefore, for the analysis of tennis mobility, t-count = 5.230 > t-table = 2.262, thus concluding that the hypothesis "there is an effect of ladder drill training on tennis mobility

in athletes aged 14-16 years in Bandar Lampung" is accepted. This means that there is an increase in tennis mobility due to the influence of ladder drill training, which is greater.

2) Control Group

Table 8. Control Group Effect Test

Variabel	Mean		Tcount	Ttable	Sig	Conclusion
Control Group	Pretest	35,30	1,908	2,262	0,001	No significant effect
	Postest	38,60				

Based on the ttable value (n-1) = (10 - 1) = 9 with a 2-way test, the value of a = 0.05 is obtained with ttable = 2.262. So for the analysis test on tennis mobility, tcount = 1.908 > ttable = 2.262, so it can be concluded that there is no difference between the pretest and posttest in the Control Group, meaning there is no increase in tennis mobility because there is no training or giving.

3) **Comparison of Experimental and Control Groups**

Table 9. Comparison Test of Experimental and Control Groups

Variable	Mean		Tcount	Ttable	Sig	Conclusion
Experimental Grup	Pretest	24,50	3,866	2,101	0,001	There is a significant comparison
Control Grup	Postest	38,60				

Based on the ttable value (n1 + n2 - 2) = (10 + 10 - 2) = 18 with a 2-way test, a = 0.05, the ttable value is 2.101. So for the comparative analysis test of the Experimental Group's tennis mobility and the control tcount = 3.866 > ttable = 2.101, so it can be concluded that there is a significant comparison of tennis mobility between the Experimental Group and the control. In addition to looking at the comparison of the tcount value with the ttable, from the average value (Mean) it can be seen that the Experimental Group has a much greater time gain.

Discussion

Based on the results of research conducted on tennis athletes aged 14-16 years in Bandar Lampung, the group division process was carried out using the ordinal pairing technique. This technique was carried out based on pretest rankings before the athletes were given treatment, with the aim of ensuring that each group had equal initial abilities. This study consisted of an

Experimental Group and a Control Group, each consisting of 10 athletes. The Control Group played an important role as a comparison to determine the effectiveness of the treatment given to the other group. The Control Group was not given any special treatment, so the results reflected natural conditions without any intervention. This helped in this study to distinguish which changes truly came from the treatment and which did not.

The data analysis to compare the Experimental Group and the Control Group revealed a significant difference. This can be seen from the t-count value, which is greater than the t-table. This means that the training or treatment given to the Experimental Group truly had a significant impact on improving mobility abilities. Not only from the statistical test, this difference is also evident from the average value, which shows that the Experimental Group had a better achievement time than the Control Group. This indicates that the training program applied to the Experimental Group helped them move faster and more agile, which is of course very important in tennis.

CONCLUSION

Based on the results of the research and discussion in the previous chapter, the conclusion can be obtained, namely "there is a significant influence of ladder drill training on tennis mobility in athletes aged 14-16 years in Bandar Lampung with a tcount value = 5.230 > ttable = 2.262".

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