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Effect of Ladder Drill Exercise on Speed, Surrounding, and Power Leg Muscle

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Abstract

This study aimed at finding the effect of ladder drill training upon: (1) run speed, (2) agility, and (2) power of leg muscle. This study is an experimental research. This study utilized one group pre test-post test design. There were total people as the subject of this research. Data collection technique used 30-meter sprint test to measure run speed, Illinois agility test to measure agility, and vertical jump test to measure power of leg muscle. Data analysis technique which was used for normality test, homogeneity test/F-test, and T-test with significant level 5% by using SPSS 16.0.0. Based on the finding, there was effect of ladder drill training upon run speed with sig value=0.007, agility and power of leg muscle with sig value=0.000. Based on the data analysis, it could be concluded that there was significant effect of ladder drill training upon run speed, agility and power of leg muscle.

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INTRODUCTION

A very popular sport, at present, is futsal. Futsal is a game played in an indoor and outdoor field, with a length of 25-42 meters and a width of 15-25 meters, by five players per team and it is arguably this sport is a combination of football, basketball, and handball. Futsal is a very fast and dynamic game because it uses a relatively small field and there is almost no room to make mistakes. Therefore, futsal players are required to have excellent physical condition. Excellent physical condition is a very supportive appearance of a player. Poor physical condition, of course, will be bad for the performance of techniques and tactics.

According to Sajoto (1995) there are ten kinds of physical conditions that need to be developed, such as strength, endurance, muscular power, speed, flexibility, agility, coordination, balance, accuracy, and reaction. In futsal game, physical condition is one of the components that absolutely must be trained. Because, futsal players who have better physical condition, then some techniques needed in futsal can be applied well too. From some components of physical condition in futsal sport, among others, endurance, speed, agility, and power are the components that must be trained properly, of course, without leaving other physical components (Lhaksana, 2011).

Speed is the ability to move the body from one point to another or to work on a repetitive activity that is the same and continuous in the shortest time (Nala, 1998). Judging from the motion system, speed is the basic ability of central nervous system mobility and muscle device to display movements at a certain speed. Speed is a combination of three elements, namely reaction time, the frequency of movement per unit of time, the speed of a certain distance.

Agility is the ability to change rapidly the direction of the body or parts of the body without disturbance of balance (Depdiknas, 2000). Meanwhile, according to Nala (1998) agility is the ability to change the position of the body, the direction of body movement quickly while moving, without losing balance or awareness of orientation to body position. Thus, agility is one element of physical condition that plays an important role, especially in futsal game, especially when dealing with opponents. A player must be able to move quickly to change direction or break away.

Power is the ability of a person to exercise maximum strength, with his efforts being deployed in short time (Sajoto, 1988). Power is needed

in this sport because with a small field model, the movement and repulsion of the athlete's feet must be fast and strong. The connection with the characteristics of futsal game, which is required to have speed, agility, and power, then the training method applied must be effective. Effective in the sense that by one method can train the three physical components or more simultaneously and in accordance with the characteristics of the futsal game itself. In recent years a training method has been developed to improve speed, coordination, agility, and power. The method is known as ladder drill, which is an excellent form of training to improve speed, coordination, agility, and overall power (Tsvikin, 2011). The method of ladder drill is a method that matches the characteristics of futsal game that prioritizes speed and agility. The point is in the agility exercise that the athlete is required to run fast, turn fast, without losing balance. So it can be said that agility training can also indirectly train speed.

The problems that I encountered during observation on 22 to 24 February 2017, when the futsal performance coaching schedule, the movement looks without and with a ball, players very slow. The game transition from defending to attack is not exploited by using speed. Movement without a ball or movement with a fastball must be supported by agility and power. Limb muscle power works when the player performs a prefix during short speed movements. While the transition survives to attack requires running speed.

Based on this, the authors are interested to reveal the effect of ladder drill training on the running speed, agility, and leg muscle power of the students of the Faculty of Sport and Health Undiksha who programmed program the Futsal Performance Class. Previous research related to ladder drill practice has also been revealed by Purnamadinata (2015). The results showed that there was a significant influence on agility and leg muscle power after futsal extracurricular students at SMAK 2 BPK Penabur Bandung were given ladder drill training for 8 weeks.

METHODS

This type of research is quasi-experiment. The design of this study using one group pre test-post test design. This design has no control group, and the subject is not placed randomly because there is only one group.

T1 x T2

The subject of this study were 30 males and a student of Faculty of Sport and Health Un-

diksha who programmed the Futsal Performance Class. The research instrument used a 30-meter sprint test to measure running speed, Illinois agility test to measure agility, and vertical jump to measure leg muscle power. Data analysis using t-test at 5% significance level, but before testing the hypothesis first tested normality using Kolmogorov-Smirnov test and Levene's Test Of Equality Error Variance test for homogeneity.

RESULT AND DISSCUSION

The normality of data distribution is tested to ensure that the study subjects are normally distributed. To know the normality of data distribution, then used the formula Kolmogorov-Smirnov at significance 0,05. If sig> 0.05 data is normally distributed, otherwise if sig <0.05 the data is not normally distributed. Based on the analysis that has been done by using SPSS 16.00 for Windows results obtained like the following table.

Ho: the variance in each group is homogeneous

Ha: the variance in each group is not homogeneous

With the test criteria used is accept Ho if the value of p> 0.05 where the data has the same variance if the resulting significance number more than 0.05. Summary of data homogeneity calculations using SPSS 16.00 for Windows can be seen in the following **table 1**.

Table 1. Normality of Data Distribution Test

Kolmogorov-Smirnov ^a		
Statistic	df	Sig.

Hasil Pretest Speed	0.078	30	0.200*
Hasil Posttest Speed	0.156	30	0.061
Hasil Pretest Agility	0.107	30	0.200*
Hasil Posttest Agility	0.135	30	0.168
Hasil Pretest Power	0.099	30	0.200*
Hasil Posttest Power	0.126	30	0.200*

Based on **table 1** above, it is seen that for all variables of significance on the Kolmogorov-Smirnov test is greater than 0.05. Thus, all distributed data is normal.

The homogeneity test of variance is done by grouping based on the given test model. The homogeneity test of variance between groups was performed with the help of SPSS 16.00 for Windows using Levene's Test Of Equality Error Variance. The statistical hypotheses tested in the homogeneity testing are as follows.

Table 2. Summary of Homogeneity Test of Variances Variances

	Levene Statistic	df1	df2	Sig.
speed	3.402	1	58	0.070
agility	0.014	1	58	0.906
power	0.382	1	58	0.539

Based on **table 2** of Levene's test results show that for test results with a significance level of running speed is 0.070, the agility is 0.906, and leg muscle power is 0.539. So, it can be concluded that the variance in each group is homogeneous.

The research hypothesis has been sug-

Table 3. Summary of Paired Samples Test Result

Paired Samples Test										
		Paired Differences					t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
					Lower	Upper				
Pair 1	Pretest Speed - Hasil Posttest Speed	0,17433	0,33013	0,06027	0,05106	0,29760	2,892	29	0,007	
Pair 2	Pretest Agility - Hasil Posttest Agility	1,00000	0,66490	0,12139	0,75172	1,24828	8,238	29	0,000	
Pair 3	Pretest Power - Hasil Posttest Power	-8,40000	4,23125	0,77252	-9,97997	-6,82003	-10,874	29	0,000	

gested that there is the influence of ladder drill results on the speed of running, agility, and leg muscle power. Hypothesis testing using t-test with the help of SPSS 16.00 for Windows. The result of analysis with t-test is presented in **table 3**.

Based on **table 3** we get significant value = 0.000 then $p < 0,05$. These results serve as a basis for making decisions. The decision taken is rejecting H_0 and accept H_a . These results suggest that there is an influence of ladder drill training on the speed of running, agility, and leg muscle power. It can be concluded that there is a significant influence between ladder drill training on running speed, agility, and leg muscle power.

Based on the first hypothesis testing, there was a significant effect of ladder drill training on running speed. Ladder drill training is an excellent form of training to improve the speed, coordination, and agility of the foot as a whole (Tsivkin, 2011). The ladder drill training is a training by using a fitness tool in the form of a ladder where an athlete will run, jump and jump by moving his legs quickly over the stairs so as to help develop the speed and agility of the athlete (Schirm in Triharsono, 2013). Based on the results of research Chandrakumar and Ramesh (2015) also showed that training of ladder drill able to increase significantly speed and agility. Running speed is needed by every player because the character of futsal game is so fast in rolling the ball to each side of the field. Thus, the practice of using a ladder drill is very effectively used to increase the speed of an athlete's run.

The results of research Hadi, et al. (2016) also showed results of increased agility after being given ladder drill training. Agility is one component of physical condition that is needed in playing futsal, because with the size of a long futsal field 25-42 meters, and width of 15-25 meters, each player must be able to move quickly and change direction without losing balance.

Based on the first hypothesis testing it turns out there is a significant influence of ladder drill training on leg muscle power. Power is the result of the multiplication of force and the time of execution ($P = F \times T$). A combination of strength and speed, shown when athletes make leaps, punches, throws and other explosive moves that require full exertion. ladder dill is a practice of various different foot movement patterns through staircase exercises placed on the ground/floor where an athlete is required to jump, move right to left quickly. Talking about jumping and moving from right to left quickly, of course, it is not far from the agility and power of the limbs. These

two components are factors that support the futsal game with the agile movement to give the ease of a futsal player moving freely in the field. This is also supported by the explosive movement of a futsal player in snatching the ball or doing a good shooting. Purnamadinata (2015) through the results of his research shows there is a significant influence on agility and leg muscle power after futsal extracurricular students in SMAK 2 BPK Penabur Bandung given ladder drill training for 8 weeks.

CONCLUSION

Based on the results of data analysis and discussion above it can be concluded that ladder drill training affects the speed of running, agility, and leg muscle power. So it is expected that futsal club coaches and futsal extracurricular teachers can implement the exercises to increase the running speed, agility and leg muscle power of the players/students.

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