The Effect of Skipping Rope and Box Jump Training Towards the Quality of Long Pass of Football Players Seen from the Leg Muscle Power

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ABSTRACT: This research aims to determine 1) the effect of skipping rope training on long passes of football players, 2) the effect of box jump training on long passes of football players, 3) the effect of skipping rope and box jump training on long passes of football players, 4) the difference in the effect of leg power on long passes of football players, and 5) analyze the interaction of skipping rope and box jump training and leg muscle strength towards long passes of football players.The type of this research was an experiment using a 2 x 2 factorial design. The method used a survey with a data collection technique using a long pass kicking ability test. The research population was the football athletes at SSB Mataram Utama U16 (U16 players of Mataram Utama Football School) totaling 16 students. Research sampling was carried out with total sampling or saturated samples. The instrument used to measure long passes used the Bobby Carlton long pass test and power used the Standing Board Jump. The data analysis technique used the paired sample t test, t test and two-way ANOVA test. The results of the first hypothesis test analysis obtain a t count value > t table (3.182), it can be concluded that there is an effect of skipping rope training on the quality of long passes of football players. The results of the second hypothesis test analysis obtain a t count value > t table (3.182), it can be concluded that there is a significant effect of box jump training on the quality of long passes in football. The results of the third hypothesis test study obtain a calculated F value = 4.763 and a significant value of 0.025, it can be concluded that there is a significant difference between skipping rope and box jump training on the quality of long passes. The results of the fourth hypothesis test study obtain a calculated F value = 24.583 and a significant value of 0.000, it can be concluded that there is a significant difference in the quality of long passes in terms of leg muscle strength. The results of the fifth hypothesis test study show that the interaction of skipping rope and box jump training and leg muscle strength on the quality of long passes have a significant value (0.005) > 0.05. The results conclude that there is an interaction between skipping rope and box jump training and leg muscle strength on the quality of long passes

KEYWORDS: Skipping rope exercise, box jump, long pass qualitty, leg power, football

I. INTRODUCTION

Football, widely regarded as one of the most popular sports today, captivates audiences with its unique blend of skill, determination, and dynamic action. The allure of the game lies in the players' ability to showcase technical ball control, exhibit intense effort, and employ strategic moves that often leave spectators in awe. A footballer is expected to possess fundamental skills and is required to master essential techniques in order to perform optimally on the field. As Putra and Hariyanto (2022) suggest, the core skills of football are defined by a player's ability to consistently demonstrate proficiency and successfully execute a variety of techniques essential to the sport. The physical condition requirement that is needed to achieve the maximum long pass target is leg muscle strength. The leg muscles are undeniably one of the most critical components for football players, particularly in executing kicking techniques [1]. Long pass is a technique that every soccer player must have. Long passes have the advantage of accelerating the flow of the ball from back to front compared to using a short pass. In addition, the long pass also has the disadvantage that the percentage of success received by team players is 50:50 compared to the short pass. We took an example at the EURO 2024 tournament yesterday, the long pass statistics were quite noteworthy, namely in the England vs Slovakia match, Kyle Walker took a total of 13 kicks with 8 successful kicks. Kyle made the highest total of long passes at EURO 2024 which was 60 kicks with 47 successful kicks.

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Long kicks are especially important in fast and aggressive types of play with long balls. A long kick is not just a simple kick. Physical aspects are required into perform long-distance ball kicking skills include running speed, step rhythm, agility, strength, and balance [2]. Leg muscle strength is a component that has an important role in the success of *long passing* in soccer games [3]. Leg muscle explosive power is important because player who want to kick long pass and want to know towards where the ball should go must pay attention to the explosive power of the leg muscle [4]. Some research at among them conducted by Mufti Alfian showed that there was an effect of leg *power* training on the quality of passing in football. And also research by Diky Pratama Putra showed the results of the effect of pliometric training on longpass in football. Based on the background that has been stated above, the researcher is interested in conducting research with the title shown above.

II. MATERIAL AND METHOD

This research employs an experimental approach characterised by a 2 x 2 factorial design. According to Hardani et al. (2020: 353), factorial design serves as an adaptation of true experimental design, incorporating considerations for potential moderator variables that may influence the effects of the independent variable on the dependent variable. In this experimental study, two distinct groups were subjected to different treatments: one group received training involving skipping rope and box jumps, while the other experienced variations in power levels—high and low. Below is the proposed research design for this experimental investigation.

The place of research is at the Mataram Utama training field. The research time was conducted in May. *Treatment* was carried out with a frequency of training 2 times a week. In general, the population can be classified into three types, namely by population size, by population characteristics, and by other differences [5]. The population in this study were 16 soccer players at SSB Mataram Utama U16.

Population in research is very important, because it is a source of information. Experts have definitions that differ slightly from one another, but in principle have the same substance [6]. Sampling in this study was carried out using a *total sampling* technique or saturated sample, namely using the entire population of SSB Mataram Utama U16 soccer players to be sampled, totaling 16 players. Saturated sample itself is included in the part of *non-probability sampling.*

The leg muscle *power* test instrument uses the *Standing Board Jump* [7] for children aged 10 years to college students, men and women used to measure leg *power*, by jumping forward. The validity coefficient is 0.607 and reliability is 0.963 with a high category. For the *long pass* test instrument using the *Bobby Charlton* hull kick ability test has a reliability of 0.833 which is sought using the two-split formula, besides that it is also used by [8] which has a validity of 0.851 and a reliability of 0.823. The data analysis technique used in this study using SPSS 20 is by using *two-way* ANOVA (*two-way* ANOVA).

III. RESULT AND DISCUSSION RESULT

The purpose of this study was to determine the effect of *skipping rope* and *box jump* training on the quality of *long pass* football players in terms of leg *power*. The description of the research results can be described as follows:

1. Data of Athletes Trained using Exercise Skipping Rope With High Power (A1B1)

The statistical results of research on athletes trained using *skipping rope* training with high *power* can be seen in the table below:

Table 1. Data Statistics of Athletes Trained Using Skipping Rope Training with High Power

Respondents	Pretest A1B1	Posttest A1B1
A	37,88	40,23
B	35,55	39,5
C	40,21	44,15
D	33,32	35,22
Mean	36,74	39,77
Median	36,71	39,86
Mode	33.32	35.22
Std. Deviation	2,97	3,66
Minimum	33,32	35,22
Maximum	40,21	44,15

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Based on the results of the above research, the average value at *pretest* was 36.74, and the average *posttest* was 39.77. to determine the magnitude of the improvement in the quality of *long passes of* soccer players trained with *skipping rope* training with high *power* in this study using the percentage increase formula. Based on the results of the above research obtained an increase in the quality of *long passes of* soccer players trained with *skipping rope* training with high *power* obtained by 8.26%.

2. Data on Athletes Trained Using Box Jump With High Power (A2B1)

The results of statistical research data on athletes trained using *box jump* training with high *power* can be seen in the table below:

Table 2. Data Statistics of Athletes Trained Using Box Jump Training With High Power

Respondents	Pretest A2B1	Posttest A2B1
A	38,45	40,4
B	35,11	38,05
C	38,02	40,15
D	40,04	42,55
Mean	37,90	40,29
Median	38,23	40,27
Mode	35.11^a	38.05^a
Std. Deviation	2,06	1,84
Minimum	35,11	38,05
Maximum	40,04	42,55
Sum	151,62	161,15

Based on the results of the above research, the average value at *pretest* was 37.91, and the average *posttest* was 40.28. To determine the amount of *box jump* training with high *power* in this study using the percentage increase formula. Based on the results the above research obtained Box Jump training with high power was obtained 6.28%.

3. Data on Athletes Trained Using Skipping Rope with Low Power

The results of statistic al research data on athletes trained using *skipping rope* training with low *power* can be seen in the table below:

Table 3. Data Statistics of Athletes Trained Using Skipping Rope Training with Low Power

Respondents	Pretest A1B2	Posttest A1B2
A	33,45	38,7
B	35,11	40,22
C	36,02	40,65
D	32,04	39,4
Mean	34,15	39,74
Median	34,28	39,81
Mode	32.04^a	38.70^a
Std. Deviation	1,77	0,86
Minimum	32,04	38,70
Maximum	36,02	40,65
Sum	136,62	158,97

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Based on the results of the above research, the average value obtained during the *pretest* was 34.15, and the average *posttest* was 39.74. To determine the magnitude of the increase in athletes trained using *skipping rope* training with low *power* in this study using the percentage increase formula. Based on the results of the above research, the increase in athletes trained using *skipping rope* training with low *power* was obtained at 16.36%.

4. Data of Athletes Trained Using Exercise Box Jump with Low Power
The research results of athletes trained using *box jump* training with low *power* can be seen in the table below:

Table 4. Data Statistics of Athletes Trained Using Box Jump with Low Power

Respondents	Pretest A2B2	osttest A2B2
A	30,25	32,45
B	33,45	35
C	35,11	37,11
D	35,75	38,05
Mean	33,640	35,65
Median	34,28	36,05
Mode	30.25[a]	32.45[a]
Std. Deviation	2,46	2,48
Minimum	30,25	32,45
Maximum	35,75	38,05
Sum	134,56	142,61

Based on the results of the above research, the average value obtained during the *pretest* was 14.05 and the average *posttest* was 13.62. To determine the magnitude of the increase in athletes trained using *box jump* training with low *power* in this study using the percentage increase formula. Based on the results of the above research obtained an increase in athletes trained using *box jump* training with low *power* obtained by 5.98%.

Normality Test
The purpose of the normality test is to determine whether the data obtained from each variable being analyzed actually follows a normal distribution pattern or not. The variable normality test was carried out using the *Saphiro Wilk* formula. The rules used to determine whether a distribution is normal or not are $p > 0.05$ the distribution is normal, and if $p < 0.05$ the distribution is abnormal.

Table 5. Normality Test

Variables		P	Si g.	Description
Group 1 (A1B1)	Pretest	0,968	0,05	Normal
	Post test	0,873	0,05	Normal
Group (A2B1) 2	Pretest	0,679	0,05	Normal
	Post test	0,824	0,05	Normal
Group (A1B2) 3	Pretest	0,834	0,05	Normal
	Post test	0,820	0,05	Normal
Group (A2B2) 4	Pretest	0,466	0,05	Normal
	Post test	0,720	0,05	Normal

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From the table above, it shows that the significance value (*p*) of all variables is greater than 0.05, so the data is normally distributed. Because all data are normally distributed, the analysis can proceed with parametric statistical analysis.

Homogenity Test

The homogenity test is useful for testing the similarity of the sample is same of not, the variant of the sample taken from the population. The criteria for homogeneity if the significant level of the count (p) > 0.05 is declared homogeneous, if the significant level of the count (p) < 0.05 the test is said to be inhomogeneous. The results of the homogeneity test of this study can be seen in the following table:

Table 6. Levene's Test of Equality of Error Variances

F	df1	df2	Sig.
2,816	3	12	0,394

Based on the data table above, the value of the significant level (0.394)> 0.05 can be concluded that the variance is homogeneous.

Hypothesis Test

1. First Hypothesis

The first hypothesis test in this study is to determine the effect of *skipping rope* training on the quality of *long passes of* soccer players in this study using the t test (*Paired sample t test*).

Pretest - posttest	d f	t table	t Count	P	Sig 5 %
High power	3	3,18 2	5,69 0	0, 011	0,05
Low power	3	3,18 2	9,22 7	0, 003	0,05

Based on the results of the t test analysis above, the value of t count> t_{tabel} (3.182), and the value of *p* < from 0.05, these results indicate that the value of t $_{count}$ is greater than t_{tabel} , thus it means that there is an effect of *skipping rope* training on the quality of *long pass* football players.

2. Second Hypothesis

The second hypothesis test in this study is to determine the significant effect of *box jump* training on the quality of *long passes of* soccer players in this study using the t test (*paired smpel t* test).

Pretest - posttest	d f	t table	t Count	P	Sig 5%
High power	3	3,18 2	10,8 57	0,002	0,05
Low power	3	3,18 2	12,1 02	0,001	0,05

Based on the results of the t test analysis above, the value of t count> t_{tabel} (3.182), and the value of *p* < from 0.05, these results indicate that the value of t $_{count}$ is greater than t_{tabel} , thus meaning that there is a significant effect of *box jump* training.

3. Third Hypothesis

Hypothesis testing was conducted to determine the significant difference between *skipping rope* and *box jump* training on *long pass* quality. Hypothesis testing in this study used *two-way* variance analysis (*Two Way Anova*) at a significant level α = 0.05.

Source	Type III Sum of Square s	df	Mean Square	F	Sig.
Correcte d Model	31.176 a	3	10,392	14,295	,000
Intercept	169,45 5	1	169,455	233,090	,00 0
Power Limbs	17,872	1	17,872	24,583	,00 0

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Exercise	4,763	1	4,763	6,552	,02 5
Leg power* Exercise	8,541	1	8,541	11,748	,00 5
Error	8,724	12	,727		
Total	209,355	1 6			
Corrected Total	39,900	15			

Based on the results of the research on the F test and the results of table 7 above, the results obtained the value of F count = 4.763 and a significant value of 0.025, these results show that the siginification value is smaller than the level α = 0.05 so that it can be interpreted if there is a significant difference between *skipping rope* and *box jump* training on *long pass* quality.

4. Fourth Hypothesis

Testing the fourth hypothesis in this study to determine significant differences in *long pass* quality in terms of leg muscle strength, using *two-way* variance analysis (*Two Way Anova*) at a significant level α = 0.05

Source	Type III Sum of Square s	df	Mean Squa r e	F	Sig.
Correct e d Model	31.176ª	3	10,392	14,295	,00 0
Intercept	169,45 5	1	169,45 5	233,09 0	,00 0
Power Limbs	17,872	1	17,872	24,583	,00 0
Exercise	4,763	1	4,763	6,552	,02 5
Leg power* Exercise	8,541	1	8,541	11,748	,00 5
Error	8,724	1 2	,727		
Total	209,35 5	1 6			
Correcte d Total	39,900	1 5			

Based on the results of the research on the F test and the results of table 8 above, it can be obtained that the value of F count = 24.583 and the significant value is 0.000. these results show that the significance value is smaller than the level α = 0.05 so that it can be interpreted if there is a significant difference in the quality of *long passes* in terms of leg muscle power.

5. Fifth Hypothesis

The fifth hypothesis test is to determine the interaction of *skipping rope* and *box jump* training and leg muscle strength on *long pass* quality. This hypothesis test uses two-way ANOVA.

Source	Type III Sum of Squares	d f	Mean Square	F	Sig .
Correct ed Model	31.176 a	3	10,392	14,29 5	,00 0
Interce	169,45	1	169,4	233,0	,00

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	pt	5		55	90	0
	Power Tungkai	17,872	1	17,872	24,583	,000
	Exercise	4,763	1	4,763	6,552	,025
	Power limbs * Exercise	8,541	1	8,541	11,748	,005
	Error	8,724	12	,727		
	Total	209,355	16			
	Corrected Total	39,900	15			

The results of the research in the table above show that the interaction of *skipping rope* and *box jump* training and leg muscle power on the quality of *long passes* (*) has a value of 0.*05*, 0.05 and 0.05, respectively.

DISCUSSION

Various kinds of basic techniques that exist in soccer games, one of which is the *long pass* kick. This *Long Pass* is a form of long distance pass kick to teammates, to do a good *long pass a* soccer player must have good physical condition, namely leg power and accuracy in fielding. Therefore there needs to be intensive training to support the improvement of long passes

IV. CONCLUSION

Based on the results of the research and the previous discussion, it can be obtained:

1. Based on the results of the analysis of the first hypothesis test, the value of t count> t_{tabel} (3.182), it can be concluded that there is an effect of *skipping rope* training on the quality of *long passes of* soccer players.
2. Based on the results of the analysis of the second hypothesis test, the value of t count> t_{tabel} (3.182), it can be concluded that there is a significant effect of *box jump* training on the quality of *long pass* football.
3. Based on the results of the third hypothesis test research, the results of the F value count = 4.763 and the significant value is 0.025, it can be concluded that there is a significant difference between *skipping rope* and *box jump* training on *long pass* quality.
4. Based on the results of the fourth hypothesis test research, the value of F count = 24.583 and a significant value of 0.000, it can be concluded that there is a significant difference in the quality of *long passes* in terms of leg muscle strength.

The results of the research on the fifth hypothesis test showed that the interaction of *skipping rope* and *box jump* training and leg muscle strength on the quality of the *long pass* (*) had a significant value (0.005) > 0.05. These results concluded that there was an interaction of *skipping rope* and *box jump* training and leg muscle strength on the quality of *long passes.*
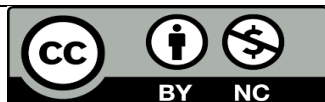
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