Relationship between Leg Muscle Power and Shooting Ability in Soccer Games

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Abstracts: The purpose of this study was to determine the relationship between leg muscle power and soccer shooting ability. The researcher wanted to determine the relationship between leg muscle power and shooting ability in soccer games in students of SMA Negeri 10 Kendari using a descriptive method with a correlational design. The population of this study was fifty students of class XI of SMA Negeri 10 Kendari. Sampling was carried out by purposive sampling, especially using the criteria of male gender, as the basis for determining the sample. Thus, the research sample consisted of 21 students. To measure leg muscle power, a standing long jump test was used and to measure shooting ability, a shooting test was used. Based on the statistical analysis of the correlation test with the SPSS 25 application, the variables of shooting ability and leg muscle power have a positive relationship. The calculated r value is 0.505 with a significance level of 0.038 <0.05 and a coefficient of determination of 0.327 or 32.7%. This shows that shooting ability in soccer matches is significantly correlated with leg muscle power. Both variables have a moderate relationship when shown on the correlation map. Leg muscle strength contributed 32.7% of shooting ability, while other physical condition parameters including strength and endurance contributed the remaining 67.3%. Speed, accuracy, coordination, and flexibility. According to the research findings, shooting ability in a soccer match was significantly correlated with leg muscle strength.

Keywords: Power, leg muscles, shooting, football

INTRODUCTION

Football is one of the most popular sports in the world played in almost every country. With simple rules and can be played on various types of fields, from grass to streets, football has its own appeal and can be followed by people of all ages and backgrounds (Fajrin et al., 2021; Rodriguez-Giustiniani et al., 2022). This game involves two teams of eleven players each, who try to score as many goals as possible into the opponent's goal during the match time (Asy'ary, 2023). Football not only tests physical skills and endurance, but also strategy, teamwork, and intelligence in making decisions (Kurniawan et al., 2016; Yılmaz & Öğüdücü, 2022). Football requires good physical fitness and trained technical skills, such as controlling the ball, dribbling, and shooting (Pinangkaan et al., 2023). Therefore, physical training and technical development are important parts of coaching soccer players from a young age. In addition, football also has a positive impact on social and psychological aspects (Jud & Sariul, 2022). This sport can develop self-confidence, improve communication skills, and strengthen cooperation between team members. In

many places, football is even used as an educational and character development tool for children and adolescents. In short, football is not just a sport, but also a medium that plays an important role in education, culture, and self-development (Bahar, 2023). In football, there are several techniques, one of which is shooting.

Shooting or the technique of kicking the ball towards the goal is one of the most crucial skills in football (Suharto et al., 2024). This technique aims to score goals, which is the essence of the game of football. Good shooting skills require not only strength but also accuracy, speed, and timing so that the ball can pass the goalkeeper and enter the opponent's goal (Kuswanta, 2021). Shooting is the most decisive moment in a football match because each goal has a major influence on the final result of the match. Technically, effective shooting is influenced by several important factors, including body position, type of kick, leg strength, and the player's ability to control the direction and speed of the ball (La Ode & Sawali, 2024). Players can use different parts of the foot to create variations in the kick, such as using the instep to produce a powerful kick, or the inside of the foot to produce a more accurate kick (Sarifudin et al., 2023). Each type of shooting has its own advantages, depending on the situation on the field, such as the position of the opponent, distance from the goal, and angle of the shot (Syahruna & Nurhidayat, 2022). To improve shooting requires elements of physical condition, one of which is leg muscle power.

High leg muscle power allows players to produce more powerful kicks. This is important for scoring goals, especially from longer distances or when facing a strong goalkeeper. Football often requires quick decisions. Leg muscle strength plays a major role in the speed of kick execution, allowing players to get off shots quickly and reduce the chances of defenders blocking the kick. Good leg muscle power allows players to balance power and control when kicking, which is important for shooting accuracy. Strong leg muscles also help players maintain body balance and posture when kicking. Strong leg muscles can help reduce the risk of injury, especially to the knees, ankles and other joints. This is especially important in sports such as football, which involve sudden changes in movement and powerful kicks. Good muscles tend to be more efficient in using energy. They can kick the ball with optimal power without using too much stamina, which is very beneficial during long matches.

Research by oleh La Ode & Sawali, (2024) that leg muscle power has a significant effect on ball speed when kicking. the relationship between leg muscle strength and ball speed in elite soccer players. They found that increasing leg muscle power can increase ball speed in shooting, which of course increases the chances of scoring goals, especially in long-range kicks. Research from Jatra & Sarwaki, (2022) this study focused on soccer athletes at various professional levels and observed the difference in muscle power between professional and amateur players. The results showed that professional players had higher leg muscle power, which contributed to their stronger and more accurate kicking performance than amateur players. This suggests that leg muscle power is an important indicator of shooting ability. These studies support the view that developing leg muscle power through explosive training, weight training, and biomechanical approaches plays an important role in improving soccer players' shooting ability.

Recent studies have shown that shooting not only depends on leg muscle strength, but also on core muscle strength and stability. The role of core muscles in maintaining balance

and posture when kicking is essential to optimize kicking power. Training that combines leg muscle strength and core muscle stability shows more effective results in improving kicking speed and accuracy. Modern research shows that mental conditions, such as self-confidence and focus, also affect the relationship between leg muscle power and shooting quality. Training that combines mental aspects, such as visualization and stress management strategies, helps players maintain kicking quality even in stressful situations. This psychological aspect is an important novelty in maximizing the transfer of leg muscle power in shooting. So the purpose of this study is to determine the relationship between leg muscle power and shooting ability in soccer games.

RESEARCH METHOD

The researcher wanted to know the relationship between leg muscle power and soccer shooting ability using descriptive method with correlational design. The population of the study was 50 students of class XI of SMA Negeri 10 Kendari 21 males and 29 females. The sample used in this study was purposive sampling with the criteria of male gender. A total of 21 students became the research sample. The standing broad jump test is a tool used to assess leg muscle power (Widiastuti, 2015). The shooting ability test is a tool used to measure the ability of players to shoot in soccer matches (Nurhasan, 2001).

The implementation is before the test begins, the test participant stretches. On the kickboard, the test subject stands. The angle formed by the bent knees is approximately 45 degrees. The test participant tries to push or jump forward with both feet while both arms are straight back. The test participant jumps three times. The longest jump is used to determine the score. The distance between the start of the kickboard and the landing location of the feet is measured. The shooting test is used to determine the player's shooting skills in soccer. (Chan, 2022) Measuring shooting ability, namely, kicking the ball quickly and accurately towards the target is the goal. The test field, ball, stopwatch, numbers, and rope are the equipment used. Implementation instructions: Before the test begins, the test participant stretches. The ball is positioned 16.5 meters in front of the goal or target, while the test participant stands behind it. No signal is given. The stopwatch starts when the test participant's foot kicks the ball and ends when the ball hits the target. The test participant is given three chances. If the ball leaves the target area without being placed 16.5 distances away, the movement is considered unsuccessful. The number of scores and the time it takes the ball to reach the target in three chances are used to determine the score. Descriptive statistical tests, prerequisite tests, normality tests, linearity tests, and correlation tests based on SPSS version 25 are all used in data analysis techniques.

RESULTS AND DISCUSSION

RESULTS

Based on the results of the standing broad jump test with the ability to shoot soccer games in class XI students of SMA Negeri 10 Kendari, the data obtained are the average value, standard deviation, maximum value, and minimum value obtained by students in each test conducted. For more details, please see table 1 below:

Table 1. Descriptive Statistics of Leg Muscle Power (X) and Shooting Ability in Soccer Game (Y)

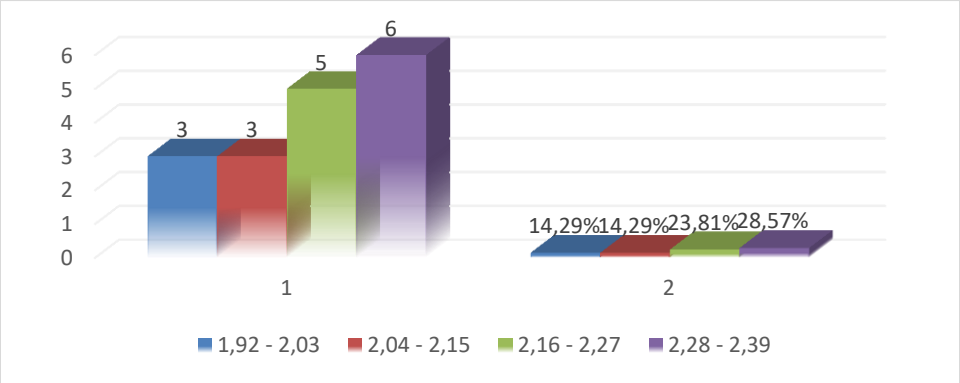
Variable	Mean	Standard Deviation	Maximum	Minimum
X	2,24	0,181	2,50	1,95
Y	98,71	16,600	129,68	56.97

Based on the results of the descriptive analysis in table 1, it can be seen that the results of the study on leg muscle power (X) obtained an average value (mean) of 2.24, a standard deviation value of 0.181, a maximum value of 2.53, and a minimum value of 1.95. While the ability to shoot football (Y) obtained an average value (mean) of 98.71, a standard deviation value of 16.600, a maximum value of 129.68, and a minimum value of 56.97.

Table 2. Distribution of Interval Classes, Frequency and Percentage of Leg Muscle Power Data (X)

Class Interval	Frequency	Percentage
1,92 - 2,03	3	14,29%
2,04 - 2,15	3	14,29%
2,16 - 2,27	5	23,81%
2,28 - 2,39	6	28,57%
2,40 - 2,51	4	19,05%
Total	21	100%

Based on the table above, it can be seen that the sample group that has a frequency interval class and percentage of leg muscle power as follows: In the interval class 1.92 - 2.03 has a frequency and percentage of 3 with a percentage of 14.29%. In the interval class 2.04 - 2.15 has a frequency and percentage of 3 with a percentage of 14.29%. In the interval class 2.16 - 2.29 has a frequency and percentage of 5 with a percentage of 23.81%. In the interval class 2.30 - 2.41 has a frequency and percentage of 6 with a percentage of 28.57%. In the interval class 2.42 - 2.53 has a frequency and percentage of 4 with a percentage of 19.05%. To be clearer graphically, the frequency distribution of leg muscle power data can be seen in the following graph:



Gambar 1. Histogram Sebaran Distribusi Frekuensi data *Power* Otot Tungkai

To see the distribution of frequency interval classes and percentages of soccer shooting ability data, see the following graph table:

Table 3. Distribution of Soccer Game Shooting Ability (Y)

Class Interval	Frequency	Percentage
59,97 - 71,50	1	4,76%
71,51 - 86,04	2	9,52%
86,05 - 100,60	10	47,62%
100,61 - 115,14	5	23,81%
115,15 - 129,68	3	14,29%
Total	21	100%

Based on the table above, it can be seen that the sample group that has an interval class, frequency and percentage of shooting ability as follows: In the interval class 59.97 - 71.50 has a frequency of 1 with a percentage of 4.76%. In the interval class 71.51 - 86.04 has a frequency of 2 with a percentage of 9.52%. In the interval class 86.05 - 100.60 has a frequency of 10 with a percentage of 47.62%. In the interval class 100.61 - 115.14 has a frequency of 5 with a percentage of 23.81%. In the interval class 27 - 30 has a frequency of 12 with a percentage of 34.3%. In the interval class 115.15 - 129.68 has a frequency of 3 with a percentage of 14.29%. To be clearer graphically, the frequency distribution of the distribution of soccer shooting ability data can be seen in the following graph:

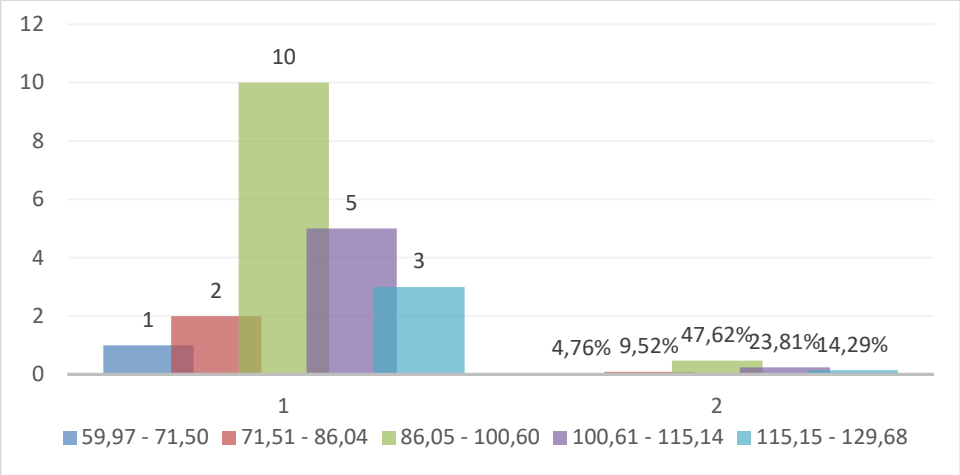


Figure 2. Shooting Football Game through Histogram

The one-sample kolmogorov-Smirnov test table is used to determine whether the data is normal or not. If the Asymp. Sig (2-tailed) value is greater than the alpha level = 0.05, the data is considered normal; if it is less than the alpha level = 0.05, the data is considered not normal. Table 4 below displays the findings of the normality test:

Table 4. Results of the Normality Test calculation

Variable	Sig	Asymp. Sig	Conclusion
X	0,200	0,05	Normal
Y	0,200	0,05	Normal

It is known that the leg muscle power data has Asymp based on the previous table. If Sig (2-tailed) 0.200 > 0.05, then the data is considered to be normally distributed. The Asymp result is the shooting ability data for a soccer match. If Sig (2-tailed) 0.200 > 0.05, then the data is considered to be normally distributed. Thus, the sample is based on a regularly distributed population, in accordance with the hypothesis.

Table 5. Linearity Test Calculation Results

Variable	Sig	Conclusion
Leg muscle power with shooting ability in soccer game	0,435	Linear

Based on the table above, the results of the linearity test indicate a relationship between X and Y with a Sig. value of 0.435 > 0.05. This shows that there is a linear relationship between the leg muscle power variable and the soccer shooting ability of class XI students of SMA Negeri 10 Kendari.

Table 6. Correlation Test Results

Correlation type	R count	Sig 0,05	R square	Description
X-Y	0,505	0.038	0,327	significant

Leg muscle power and soccer shooting ability have a significant relationship (r2) of 0.327, meaning that 32.7% of soccer shooting ability is determined by leg muscle power. This can be seen from the table above which shows that the correlation coefficient between leg muscle power and soccer shooting ability (rxy) is 0.505. The rxy value obtained is compared with the correlation table value at a significance level of 0.038 <0.05.

DISCUSSION

Leg muscle power is a combination of strength and speed, which is essential for producing maximum force in a short period of time. In the context of soccer shooting, this power helps players achieve optimal kicking speed and power, which not only increases distance but also accuracy and precision of the shot. Players with better leg muscle power tend to be able to kick the ball at higher speeds, which increases their chances of scoring. In addition, good power allows for better control over the direction and distance of the kick, which plays a big role in the execution of a shot on goal.

The act of shooting involves a complex dynamic movement, in which the lower leg muscles work together to generate force directed at the ball. Muscle strength allows the player to make a powerful shot, while speed in the final phase of the kick (follow-through) helps determine accuracy. Good muscle power results in a kick with high speed and optimal power, which is the goal of shooting training.

Several studies have shown that leg muscle strength and power play an important role in football performance, especially in shooting skills. For example, a study by Jatra & Sarwaki, (2022), found that there was a significant correlation between leg strength and shooting speed, where players with stronger leg muscles tended to produce faster shots. Another study by Jumaking, (2020), also showed that players with high levels of power in their legs had better ability to control the direction and accuracy of the kick. This is because stronger and more responsive muscles can provide better control at the end of the kicking phase. In another study, there were findings showing significant differences between professional players and novice players in terms of leg muscle power and shooting ability. Professional players who have higher power tend to have better shooting performance than novice players. This suggests that leg muscle power contributes to achieving more accurate and consistent shooting abilities. Previous studies have underlined the importance of training that targets leg muscle power, especially using plyometric methods and strength training. These findings provide guidance for coaches to design programs that can significantly increase leg muscle power, which has a direct impact on shooting quality in football.

CONCLUSION

Based on the results of research on the relationship between leg muscle power and shooting ability in soccer games, it can be concluded that there is a significant relationship between the two. High leg muscle power tends to contribute to increased shooting ability,

because the strength and speed of leg muscle contractions play an important role in producing the power needed to kick the ball quickly and accurately.

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