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The Relationship Between Leg Muscle Explosive Power and Strength with Dribbling Skills in Football Games

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Abstract. This research endeavors to analyze the extent to which lower limb explosive power and leg muscle strength influence dribbling proficiency among 13 to 15 year old football players at SSB Bhineka Gubug FC. The methodology in this study aligns with the principles of quantitative descriptive research. The study population includes all male players of SSB Bhineka Gubug FC aged 13-15 years, with a research sample of 22 players selected using the total sampling technique. The data subjected to correlation analysis using SPSS version 26, with the significance level set at 0.05. Based on the outcomesvof this analysis, the study yields the following conclusion : (1) A significant contribution of leg muscle explosive power to ball dribbling skills was obsserved ; (2) Leg muscle strength contributes significantly to ball dribbling skills ; (3) Leg muscle explosive power and leg muscle strength together contribute significantly to ball dribbling skills, with both variables explaining 83.6% of the variation in ball dribbling skills.

Keywords : Leg muscle explosive power; Leg muscle strength; Ball dribbling; Football

1 Introduction

Football is a game that brings together two teams, each team consists of 11 players divided into several positions such as goalkeepers, midfielders, defenders, and attackers. Football matches are held on a field with dimensions of 64-75 meters in width and extending between 100-110 meters in length (Irfan Muhammad et al., 2020). The main goal in the sport of football is, for each competing team, to actively try to get the ball into the opponent's goal as much humanly possible and, at the same time, diligently prevent their own goal from being conceded by opposition (Faruk et al., 2012). To achieve this goal, every football athlete needs to master basic movement techniques that include various important skills, specifically categorized as running, dribbling the ball, passing, and shooting (Bozkurt et al., 2020). Basic techniques are a very important component to have in order to be able to play football (Wildan Ramadhani, 2023). This basic technique is an important foundation for every player (Fajrin et al., 2021).

Basic techniques in playing football include passing, dribbling, controlling, heading, and shooting (Septian et al., 2024). Each technique plays a key role in determining the outcome of the match (Irawan et al., 2024). One technique that requires good mastery of skills is the

dribbling technique , because the dribbling technique has a very important role and is often used by players when playing football (Erfayliana & Wati, 2021).

Dribbling in football is a technique of pushing the ball intermittently by keeping the ball close to the feet, this is necessary to move agilely to support a team's strategy in carrying out defensive or attacking variations (Mubarok & Mudzakir, 2020). Dribbling gives players the opportunity to pass opponents, and creates attacking opportunities if done well, and regulates the rhythm of the game. To be an exceptionally skilled and effective player, he must be able to handle various forces by dribbling the ball and controlling the ball with both feet proficiently well (Septiasari & Yuliarto, 2021). However, the effectiveness of dribbling does not only refer to technique, but also needs to pay attention to the physical condition of the player, especially explosive power and leg muscle strength.

According to Ridwan & Irawan (2018), the development of physical, technical, tactical, and strategic aspects from a young age has a fundamental role and is the foundation in playing football. Furthermore, Mahardika (2020) added that athletes must have adequate physical condition according to the type of sport they are involved in. Explosive power undeniably is one of the important and absolutely necessary components of physical condition that athletes must be possessed in playing football quite significantly. Explosive power is fundamentally defined as the ability of a person's muscles to use maximum strength in the shortest possible time with incredible speed (Putri Isabella & Perwira Bakti, 2021). Rosadi et al. (2021) stated that explosive leg muscle power is the ability of muscles to produce explosive power. The leg muscle component is very vital for football players because explosive power is fundamentally understood the result of speed and strength that work together harmoniosly now. This is supported by Putri Isabella & Perwira Bakti (2021) who stated that leg muscle strength is an explosive movement that uses a group of muscles. Explosive power and adequate leg muscle strength play an important role in supporting the explosive movements required when dribbling the ball, such as fast acceleration, agile changes of direction, and maintaining balance when facing an opponent.

The importance of muscle strength and explosive power in football performance has been widely recognized by several researchers, such as according to Abdul Gaffar, Maulidin, dan Intan Kusuma Wardani (2021) who stated that developing physical attributes such as muscle explosive power can have a positive impact on technical skills, including dribbling the ball. This is supported by Andiyanto (2020) which shows a significant relationship between technical performance and muscle explosive power in sports. In the study of Rosadi et al. (2021) also emphasized that developing muscle explosive power can improve technical skills in football. However, research that specifically analyzes the relationship between these two physical components and dribbling skills , especially in young players, is still relatively limited. Most previous studies tend to focus on the aspects of strength and endurance separately, or only examine one of the two components.

This study is based on the theory of sports biomechanics which explains that muscle explosive power allows explosive movements that are important in dribbling the ball (Pratama, 2023). In addition, the theory of motor development emphasizes that the age of young players (13-15 years) is the optimal phase for developing motor skills (Khuluqo, 2020). So this study aims to answer questions related to how increasing muscle explosive power is expected to make a significant contribution to their dribbling ability .

Based on the description above, this study aims to analyze the relationship between explosive power and leg muscle strength with dribbling skills in Bhineka Gubug FC football players aged 13-15 years. Using a quantitative approach, this study will measure and analyze the correlation between the two variables. The results of this study are expected to potentially provide an understanding of how leg muscles contribute to dribbling skills and skills .

2 Research Methods

This research design uses two independent variables in particular and one dependent variable that are analyzed correlationally with a quantitative approach. This design effectivelly enable allows researchers to start the relationship between two independent variables consisting of leg muscle explosive power (X1) leg muscle strength (X2), and one dependent variable, namely ball dribbling skills (Y). The following is a description of the research design model that will be used:

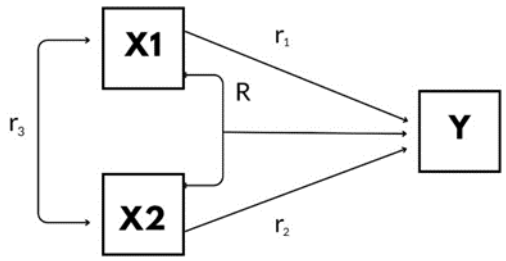

Figure 1Research Design

The population in this study were Bhineka Gubug FC football players aged 13-15 years. The sampling method in this study used the total sampling method , where all players who met the criteria as a population would be included in this study (Melda Salsabillah, Ahmad Sabandi, Nurhizrah Gistituati, 2020). The total sample taken was 22 players. The instruments that will be used in this study include : 1) Vertical jump test for leg muscle explosive power 2) Leg dynamometer test condected to assess leg muscle strength 3) Dribbling skills , the instrument used is an instrument from Ramadhan & Widodo (2019). Data analysis strategically employed descriptive and inferential analysis. The results of the data obtained will be tested with a single correlation test and multiple correlation. Before the correlation and regression analysis was carried out, the data was first tested with a normality test (shapiro-wilk), linearity test, and multicollinearity test to ensure that the basic assumptions of parametric statistical analysis were met. This statistical data analysis was meticulously carried out using the program in SPSS Statistics 26 with a significance level specifically used of $p < 0.05$.

3 Results

Descriptive analysis in this study aims to obtain a general description of the explosive power of leg muscles, leg muscle strength , and ball dribbling skills of SSB Bhineka Gubug FC

students when playing football. The results of the descriptive analysis pertaining to each variable in this study can be seen in table 1

Table 1Results of descriptive analysis of each variable

Statistics	Power Muscle Explosion Legs	Strength Muscle Legs	Dribbling Football
N	22	22	22
Sum	1073.00	1205.00	175.50
Mean	48.7727	54.7773	7.9777
Std. Deviation	7.07061	10.30339	0.41147
Range	28.00	42.40	1.44
Min.	34.00	37.30	7.15
Max	62.00	79.70	8.59

Based directly upon on the data presented in Table 1 herewith, the results can be described as follows:

a. Data regarding Power explosion leg muscles in SSB Bhineka Gubug FC students with a sample size of 22 showed a total score of 1073.00, the data average at of 48.7727 and the standard deviation was 7.07061. The range of values reached 28.00, with score lowest 34.00 and highest 62.00.
b. Power data muscle legs from 22 samples showed a total score of 1205.00, an average value of 54.7773, and a standard deviation figure of 10.30339. The range of values was 42.40, with minimum value 37.30 and maximum 79.70.
c. Data regarding skills dribbling football from 22 samples shows a total score of 175.50, with an average value of 7.9777 and the standard figure deviation of 0.41147. The score range is 1.44, with a minimum value of 7.15 and a maximum of 8.59

The data normality test, specifically using the Shapiro-Wilk (SW) method is detailed in the summary in Table 2 below.

Table 2. The results of normality testing for each variable .

Variables	SW	P	α	Note .
Power explosion muscle legs	0.971	0, 734	0.05	Normal
Leg Muscle Strength	0, 956	0, 415	0.05	Normal
Dribbling football	0, 940	0.196	0.05	Normal

The findings from the Shapiro-Wilk normality analysis of leg muscle explosive power, leg muscle strength, and dribbling skills in football games are presented in Table 2 and can be explained as follows.:

a. Power Explosion Muscle Legs : With a Shapiro-Wilk statistic of 0.971 and a significance level (p-value) of 0.734, the data is deemed normally distributed because the p-value is greater than 0.05.
b. Strength Muscle Legs : The normality test produced a Shapiro-Wilk value of 0.956 and a significance value of 0.415. Because p value more big from 0.05, then power data distribution muscle legs Also can declared normal.
c. Skills Dribbling : For variable In this case , the Shapiro-Wilk value obtained was 0.940 with a significance of 0.196. The value the be on top limit significance 0.05, so the skill data dribbling This own normal distribution .

In this study, to determine the linearity of the relationship between the variables, the F difference test ($F_{difference}$) was employed, which was analyzed with the help of SPSS software. The value analyzed was $_{the\ calculated\ F}$ on the Deviation from Linearity component. that is size of deviation from linear relationship . The summary of linearity test outcomes for all variables is presented in Table 3 below :

Table 3Linearity Test Results for Each Variable.

Variables	F Count	P	Conclusion
Power explosion muscle legs (X1) And Football Dribbling Skills (Y)	0.407	0, 922	Linear
Leg Muscle Strength (X2) And Football Dribbling Skills (Y)	13, 985	0, 069	Linear

It is known that based on the analysis results, the relationship between leg muscle explosive power (X1) and football dribbling skills (Y) shows a $_{calculated}$ F value of 0.407 with a significance value (p) of 0.922. Since the p-value is above 0.05, we can conclude that the two variables have a linear association. Meanwhile, in the relationship between leg muscle strength (X2) and football dribbling skills (Y), the $_{calculated}$ F value is 13.985 with a significance value (p) of 0.069. Although the $_{calculated}$ F value is quite high, the p value which is still greater than 0.05 indicates that there is no significant deviation from linearity. Therefore, the relationship between these two variables can also be stated as linear.

To ascertain the absence of excessive correlation (multicollinearity) among the independent variables, a specific test was conducted. Given that the analytical method used in this research is multiple linear regression, this test is essential. Table 4 below provides a summary of the multicollinearity test results for each variable.

Table 4Summary of multicollinearity test results for each variable.

Variables	Collinearity Statistics		Conclusion
	Tolerance	VIF	
Leg Muscle Explosive Power (X1)	0.372	2,685	No Multicollinearity
Strength Muscle Legs (X1)	0.372	2,685	No Multicollinearity

To assess multicollinearity, Tolerance and Variance Inflation Factor (VIF) values are observed. A Tolerance value above 0.100 and a VIF below 10.00 indicate the absence of multicollinearity among independent variables. Based on the multicollinearity test results presented in the table, the following information was obtained.

a. The variable Power leg muscle explosion (X1) showed a Tolerance value of 0.372. This value is greater than the required 0.100. Additionally, the VIF for this variable was 2.685, which is significantly less than the 10.00 threshold. Therefore, it can be concluded that the variable Power leg muscle explosion (X1) does not exhibit multicollinearity.
b. Likewise on leg muscle strength variable (X2), the Tolerance value is 0.372 and the VIF value is 2.685, which is also lower than 10.00. Thus, the leg muscle strength variable (X2) does not experience multicollinearity.

The following conclusions are drawn from the test results of the three prerequisites, all variables meet the required criteria. Therefore, this study can be continued with simple correlation and multiple correlation tests.

To identify the relationship between independent and dependent variables and to test the proposed hypothesis, the collected data were subsequently analyzed using correlation and regression techniques. The outcomes of the hypothesis test, focusing on the influence of leg muscle explosive power on dribbling skills in football, are presented in summary form in Table 5 below :

Table 5. Correlation Results between Leg Muscle Explosive Power with Dribbling Skills .

Variables	R	P	Conclusion
Power explosion muscle Legs (X1)	- 0.8 69	0.000	Significant
Dribbling football (Y)			

Based on the results of the analysis using product moment correlation , the Pearson correlation coefficient (R) value between leg muscle explosive power (X1) and football

dribbling skills (Y) was obtained at -0.869 with a significance level (p) of 0.000. The R value of -0.869 indicates a very strong relationship between the two variables. The negative sign on the correlation coefficient indicates that the relationship that occurs is negative, namely an increase in leg muscle explosive power is followed by a decrease in dribbling time scores , which means in this context indicates an increase in dribbling ability . With a significance value (p) smaller than 0.05 (p = 0.000), the null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is accepted. This means that there is a statistically significant relationship between leg muscle explosive power and football dribbling skills in SSB Bhineka Gubug FC players.

The collected research data were analyzed using correlation and regression to determine variable relationships and test the hypothesis. The outcomes of the hypothesis testing focused on the contribution of leg muscle strength to football dribbling skills are presented in the summary in Table 6 below :

Table 6Correlation Results of Leg Muscle Strength with Dribbling Skills

Variables	R	P	Conclusion
Leg Muscle Strength (X2)	- 0.862	0.001	Significant
Dribbling football (Y)			

With a Pearson correlation coefficient (R) of -0.862 (p = 0.001) obtained from the product moment correlation analysis, a very strong negative relationship exists between leg muscle strength (X1) and football dribbling skills (Y). This implies that as leg muscle strength increases, football dribbling skills tend to improve. Because the significance value (p = 0.001) is less than 0.05, the null hypothesis (H0) is rejected and the alternative hypothesis (H1) is accepted. The analysis indicates a statistically significant relationship between leg muscle strength and football dribbling skills within the student population of SSB Bhineka Gubug FC.

To establish the correlation between leg muscle explosive power and leg muscle strength with dribbling skills in football, and to test the overarching hypothesis, the gathered research data underwent correlation and regression analysis. The subsequent summary in Table 7 presents the results of this hypothesis test :

Table 7Correlation Results of Leg Muscle Explosive Power and Leg Muscle Strength with Dribbling Skills

Variables	R	r_2	F	P	Conclusion
Power explosion muscle legs (X1), and strength muscle Legs (X2)	0.914	0.836	48,508	0.000	Significant
Dribbling football (Y)					

Summarizing the results In Table 7 above , the multiple correlation coefficient (R) value of 0.914 is obtained, indicating a very strong relationship between Leg muscle explosive power (X1) and Leg muscle strength (X2) simultaneously with football dribbling (Y). The

significance value (P) of 0.000 (which means p <0.001) is smaller than 0.05 (p <0.05). This shows that the influence of Leg muscle explosive power (X1) and Leg muscle strength (X2) simultaneously on football dribbling (Y) is very significant. statistically . The large Regression F value (F=48.508) with very low significance also confirms that this regression model is overall significant in predicting football Dribbling based on the two independent variables. The coefficient of determination (R2) value of 0.836 (or 83.6%) indicates that 83.6% of the variation in football Dribbling (Y) can be explained jointly by variations in Leg muscle power (X1) and Leg muscle strength (X2). Based on the significance value (p = 0.000) which is less than 0.05, the Null Hypothesis (H0) is rejected and the Alternative Hypothesis (H1) is accepted . This means that statistically, Leg muscle power and Leg muscle strength together have a significant effect on football Dribbling in SSB Bhineka Gubug FC students .

4 Discussion

Discussion of Results Regarding the Relationship between Leg Muscle Explosive Power and Football Dribbling Skills in SSB Bhineka Gubug FC Students

This study's statistical analysis demonstrated that leg muscle explosive power significantly contributes to the football dribbling skills of students at SSB Bhineka Gubug FC. This indicates that students' ability to produce explosive movements with their leg muscles plays an important role in their effectiveness when dribbling the ball, allowing for fast acceleration, agile changes of direction, and better ball control. Leg muscle explosive power allows players to accelerate quickly when carrying the ball, change direction agilely, and defend the ball from opponents. This ability is very important in dribbling to pass defenders, create space, and bring the ball to the attack area. Thus, leg muscle explosive power is one of the physical factors that contributes significantly to the quality of dribbling skills in football games.

The Relationship between Leg Muscle Strength and Football Dribbling Skills in SSB Bhineka Gubug FC Students

Statistical analysis indicates a contribution of leg muscle strength to the football dribbling skills of SSB Bhineka Gubug FC students. This implies that football players with good leg muscle strength tend to have more effective dribbling skills . Leg muscle strength plays an important role in producing explosive acceleration when carrying the ball, maintaining body balance when moving agilely, and making quick changes of direction. This ability allows players to control the ball better when passing opponents, maintaining ball possession, and creating attacking opportunities. Thus, leg muscle strength is one of the essential physical components in supporting the quality of dribbling skills in football games.

The relationship between explosive power of leg muscles and leg muscle strength with dribbling skills in football games of SSB Bhineka Gubug FC students

This study's statistical analysis reveals that both leg muscle explosive power and leg muscle strength contribute to the football dribbling skills of students at SSB Bhineka Gubug FC. This indicates that both of these physical aspects of the legs together play an important role in improving the dribbling skills of players.

a. Power explosion muscle legs give ability For do acceleration explosive moment start dribbling , doing change fast direction And suddenly For outwit opponents , and create superiority speed in carry the ball.

b. Strength muscle legs supports body stability and balance when moving agilely with the ball, allows players to maintain control of the ball from pressure from opponents , and produce the power required For do movement effective dribbling in various situation .

Thus, the combination of explosive power that produces speed and agility, and muscular strength that supports stability and control, also forms a crucial physical foundation for football players to develop optimal dribbling skills . These two aspects work synergistically to enable players to pass opponents, create space, and carry the ball into the attacking area effectively.

5 Conclusions

The following conclusions are drawn based on the findings and discussions presented in this study Power explosion muscle leg (X1) gives contribution to skills dribbling (Y) on player SSB Bhineka Gubug FC student football. This means that the higher Power explosion muscle legs , increasingly good ability too dribbling player the, strength muscle legs (X2) too contribute to skills dribbling (Y), which indicates that player with muscle strength more legs Good tend own skills more optimal dribbling and power explosion muscle leg (X1) and leg muscle strength (X2) together give significant contribution to skills dribbling (Y). This indicates that the combination of both physical factors the own an important role in increase ability dribbling player .

The findings suggest that explosive leg muscle power (X1) and leg muscle strength (X2) are vital physical determinants that exert a substantial influence, both separately and in conjunction, on the dribbling skills (Y) of 13-15 year old students at SSB Bhineka Gubug FC.

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