

## Correlation between Limb Muscle Exploitative Strength to Futsal Shooting Ability

Mokhamad Parmadi <sup>1\*</sup>, Sekar Ayu Wigunani <sup>1</sup>, Agus Setia Budi <sup>2</sup>, Wisnu Murtiansyah<sup>3</sup>,  
Ari Susanto <sup>4</sup>

<sup>1</sup>*Department of Sport Education, Faculty of Teacher and Training, Universitas Ma'arif Nahdlatul Ulama Kebumen, Indonesia*

<sup>2</sup>*Madrasah Tsanawiyah Miftahul Huda Kemangunan, Kebumen, Indonesia*

<sup>3</sup>*Department of Sport Education, School of Postgraduates Studies, Universitas Pendidikan Indonesia, Bandung, Indonesia*

<sup>4</sup> *Universitas Ma'arif Nahdlatul Ulama Kebumen, Indonesia*

\*email corresponding author: [parmadimokhamad@gmail.com](mailto:parmadimokhamad@gmail.com)

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### Abstract

This study aims to determine the relationship between the explosive power of leg muscles and the ability to shoot futsal. This research is a quantitative study with a correlational type. The sample in this study was 30 members of the Ababil futsal club. The instrument used in this study is a test of limb muscle exploitative strength and futsal shooting ability. The analysis techniques used are quantified statistics accompanied by hypothesis testing. Conclusions from the research findings are that there is a very meaningful relationship between the explosive power of the limb muscles and the shooting ability. Supporting data in addition to correlation, also found that the average explosive power of the player's limb muscles is 80, which reduces the average obtained player at the time of the ability test *shooting* in futsal games is 7.4. The results of this study have implications for paying special attention to athletes, especially the explosive power of the leg muscles because they contribute to the ability to shoot futsal. Special attention can be the program Exercises for the increased explosive power of limb muscles varied in certain Exercises. It is recommended for coaches and futsal coaches to pay attention to the elements of the explosive power of limb muscles in improving the ability to shoot in the game of futsal. It is expected in other studies to be able to see several other factors that have not been considered in this study.

**Keywords:** leg muscle, explosive power, shooting, futsal

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## 1. INTRODUCTION

The development of futsal is currently very fast. The uniqueness of futsal has received attention from all walks of life in remote parts of the country and throughout the world in general, so futsal is the main attraction for people to pursue this sport. Futsal is an abbreviation of *futbol* (soccer) and *sala* (room) from Spanish or *futebol* (Portugal/Brazil) and *salon* (France) (Irawan & Limanto, 2021; Silva, 2020). The game of futsal is almost the same as football, but futsal is played on a field that is smaller than a football field. Futsal can be done in a closed room (indoor) and open (outdoor) with a field made of synthetic materials. This sport forms a player to always be ready to receive and pass the ball quickly under pressure from opposing players. The rules of the futsal game for the substitution zone are an area on the sidelines of the field in front of the team seats used by players to enter and leave the field or change players (Pizarro et al., 2019; Sulistianoro & Setyawan, 2021; Widiyono & Mudiono, 2021).

Futsal is a football game played by two teams, each consisting of five people including the goalkeeper (Burhaein et al., 2020; Riyadi & Doewes, 2017). The goal of the futsal game is to get the ball into the opponent's goal as much as possible without deviating from the applicable game rules. The game of futsal is more dynamic, because the movement is fast and different from football, therefore the number of goals created in the game of futsal is generally more (Paskalis et al., 2022; Sabdono et al., 2019). To be able to play futsal well, a player must have the elements of physical, technical, tactical, and mental conditions so that they have a strong foundation for achievement. One aspect of training that must be considered is technical training. In the game of futsal there are several basic techniques that must be mastered. The basic techniques of futsal that must be mastered by every futsal player include passing-stopping, dribbling, heading, and shooting techniques. Regarding the basic futsal techniques that must be mastered, controlling, dribbling, kicking, passing the ball, shooting, and heading the ball (Hidayat et al., 2022; Prasetya, 2021).

One of the basic futsal techniques is shooting. Shooting is a kick toward the goal to create a goal. Shooting is kicking the ball hard into the goal to score goals. This is also the most difficult part because it requires maturity and ingenuity of players in kicking the ball so that it cannot be reached or caught by the keeper (Burhaein, 2022; Phytanza et al., 2018). Shooting is characterized by a very fast and hard ball speed and is difficult for the goalkeeper to anticipate. However, good shooting must combine the power and accuracy of the shot. Shooting can be done with all parts of the foot, especially the instep, the inside of the foot, the outside of the foot and the toe. It takes a physical component in the form of good leg strength. This can be obtained from sufficient physical exercise and learning techniques slowly and gradually.

Ababil Purworejo Futsal Club is a futsal club located in Purworejo, Central Java. This club aims to create professional players or athletes with the average player taking education, in the Ababil Purworejo Futsal Club during my observations as a player of Ababil Purworejo Futsal Club there were problems when competing, namely players often shooting not on the desired target, does not cover the possibility of a ball that bounces high and when shooting its power is weak. Judging from the matches that the Ababil Purworejo Futsal Club has participated in, it is difficult for this club to win, and the achievements of the Ababil Purworejo Club Futsal team are decreasing, the Ababil Purworejo Futsal Club cannot take advantage of shooting opportunities effectively, so the ball goes wide, soars over the bar. goal or hit by a defender from the opponent,

the power created for shooting is sometimes weak so that a counterattack occurs which results in the team losing. From some observations the author made in the field, the authors found problems, namely the weakness of leg muscle power and the accuracy of the kicks of the Ababil Purworejo Futsal Club team. And at the time of the match the author observed while playing during the game. Based on the description above, the author suspects that there is a lack of leg muscle explosive power training and shooting training in the training program of the Ababil Purworejo Futsal Club team. Based on the problems above, the author wishes correlation of exploitive power of limb muscle to shooting ability in ababil purworejo futsal club.

## **2. METHOD**

### **2.1 Participants**

The population is a group consisting of objects or subjects that have certain qualities and characteristics determined by researchers to be studied and then drawn conclusions (Fraenkel et al., 2012). In this study, the population used was Ababil Purworejo Futsal Club Players totaling 30 people. The sample is part of the population that has the same characteristics as the population. The sampling technique in this study uses probability sampling technique, which is a sampling technique that provides equal opportunities for each element (member) of the population to be selected as a sample member. There are various probability sampling techniques, namely simple random sampling, proportionate stratified random sampling, disproportionate stratified random, sampling area (cluster) sampling (Fraenkel et al., 2012). The sample is part or representative of the population to be studied. Sampling for research according to Fraenkel et al. (2012), if the subject is less than 100 people should be taken altogether, if the subject is large or more than 100 people can be taken 10-15% or 20-25% or more. Based on the above understanding, the sample in this study was 30 members of the Ababil futsal club.

### **2.2 Research Design**

The type of quantitative method used is a correlational method, which is descriptive and associative in a causal relationship. Research design is an approach used in a study. This type of research is a correlational study that aims to determine the relationship of the limb muscle explosive power-free variable with the bound variable of shooting results. The correlation coefficient is one of the statistical tools that can be used to compare the results of measurements and different variables in order to determine the degree of relationship between variables.

### **2.3 Instruments**

#### **2.3.1. Measurement of Limb Muscle Explosion**

Muscle explosive power is the ability of a muscle or a group of muscles to do work explosively, that is, quickly and strongly. The ability of muscle explosive power is needed for sports athletes who require fast and strong movements (Putra et al., 2021; Susanto et al., 2022). We can measure muscle explosive power with a simple tool, specifically for measuring leg muscle explosive power it can be done with an upright jump. The player whose explosive power will be measured must perform a vertical jump.

How to measure leg muscle explosive power with an upright jump.

#### **1. Tools**

##### **a) Scale board**

- b) Whiteboard eraser
  - c) Lime powder/magnesium sulfate
  - d) Stationery
2. Implementation preparation
- a) The scale board on the wall is as high as the measured student/athlete's achievement
  - b) Before doing the jump, the hands are sprinkled with lime powder
  - c) Participants stand under the scale board in a sideways position
  - d) The hand that will be used through the scale board is lifted up high and affixed to the scale board until it is imprinted and can be read on the scale board. This sign is point A.
3. Movement
- a) Perform a lower body movement by bending both knees.
  - b) Do a jump up as high as possible and at the peak of the jump, clap or put your hands on the scale board, the mark that makes an imprint on the scale board is point B.
  - c) The difference between point B and point A is the jump performance.

To see the results of the explosive power of the leg muscles, match the table below:

**Tabel 1.**

*Norma Vertical Jump*

Result	Score
> 89	Score 10
86-88	Score 9
81-85	Score 8
76-80	Score 7
71-75	Score 6
66-70	Score 5
60-65	Score 4
50-59	Score 3
40-49	Score 2
< 40	Score 1

Source: Deane et al. (2005)

### 2.3.2. Shooting Measurement

The technique for measuring the results of shooting (shooting) on futsal players is carried out as follows:

- 1) Preparation: the testee stands in the designated area, namely on the right or left side at a

distance of 5 feet, listening to the signal "yes" the testee shoots at goal 10 times.

- 2) Score: the incoming ball is scored one.
- 3) Scoring: each incoming ball is given a score of one. The test score is the number of balls that go into the goal, the more balls in the test score the better.
- 4) Objective: measure and find out the results of shots (shooting) in the futsal game researchers.

## 2.4 Procedures

The technique that will be used in data collection in this study is the test method. The test used is a test of deeds or practices. The test is a comprehensive way of assessing an individual or the entire effort of evaluating a program or test is a tool for collecting information but when compared to other tools this test is more official because it is full of limitations. Instruments or tools used to collect data on vertical jump test problems to measure the explosive power of limb muscles and shooting ability tests to obtain shooting data.

## 2.5 Data Analysis

The analysis technique in this research is quantitative analysis which is used to discuss dynamic problems by using data in the form of numbers (Fraenkel et al., 2012). To determine the relationship between leg muscle explosive power and the shooting ability of the Ababil Purworejo Futsal Club, the tests used are as follows:

### 1) Test Requirements Research

Before testing the hypothesis, the requirements test is carried out which includes the normality test and linearity test. The second test of the prerequisite tests used the SPSS (Statistical Package and Social Science) software version 25.0 for windows.

### 2) Normality test

Interval scale data as a result of measurements generally follow a normal distribution or not, so a normality test is carried out to find out. The certainty of the fulfillment of the normality requirements will ensure that further statistical steps can be accounted for, so that the conclusions from the data obtained can be justified.

### 3) Linearity Test

The linearity test is to find out whether the independent variables used as predictors have a linear relationship or not with the dependent variable. Linear certainty whether or not the distribution of the scores of the data held is not sufficiently accounted for by assumptions. To obtain this certainty, a linearity test must be carried out using the F statistical test, which is declared linear if the p value is greater than 0.05. On the other hand, if the p value is less than 0.05, it is declared non-linear.

### 4) Research Hypothesis Test

The analysis can be continued by calculating the regression equation. The regression equation is used to predict how high the value of the dependent variable will be when the value of the independent variable is manipulated (Sugiyono, 2016). The regression equation used is a simple regression equation (with one predictor) which can be formulated as follows:

$$Y' = a + b X$$

Information :

Y' = Shooting ability

a = regression constant

b = regression coefficient

X = leg muscle explosive power

Source: Sugiyono (2016)

As for testing the proposed hypothesis is done by using the t test. The t test is an individual test between the independent variables and the dependent variable. In this study, the t-test was used to determine whether there was a significant relationship between the explosive power of the leg muscles and the shooting ability of the Ababil Futsal Club Purworejo. The formula used is:

$$t = \frac{r_p \sqrt{n-3}}{\sqrt{1-r_p^2}}$$

Source: Fraenkel et al. (2012); Sugiyono (2016)

To make it easier to analyze the data obtained, the authors use a computer tool, namely SPSS for windows 25.0. From the results of the analysis, the t count is compared with the t table. If t count < t table, then Ho is accepted and Ha is rejected. Compared if t count > t table, then Ho is rejected, and Ha is accepted.

### 3. RESULTS

The data of this study were used to determine the relationship between the explosive power of the leg muscles and the shooting ability of the Ababil Futsal Club in Purworejo. The results of the study are described as follows:

#### 3.1. Description of the results of the Limb Muscle Explosive Power Measurement

The results of the explosive power measurement of the leg muscles were described using statistical analysis. The data is presented in tabular form as follows:

**Table 2.**

*Description of Vertical Jump Test Result Data*

<i>Item Test</i>	N	Mean	Median	Modus	SD	Max	Min
<i>Vertical Jump</i>	30	80	80	75	6,70	95	70

Source: primary data

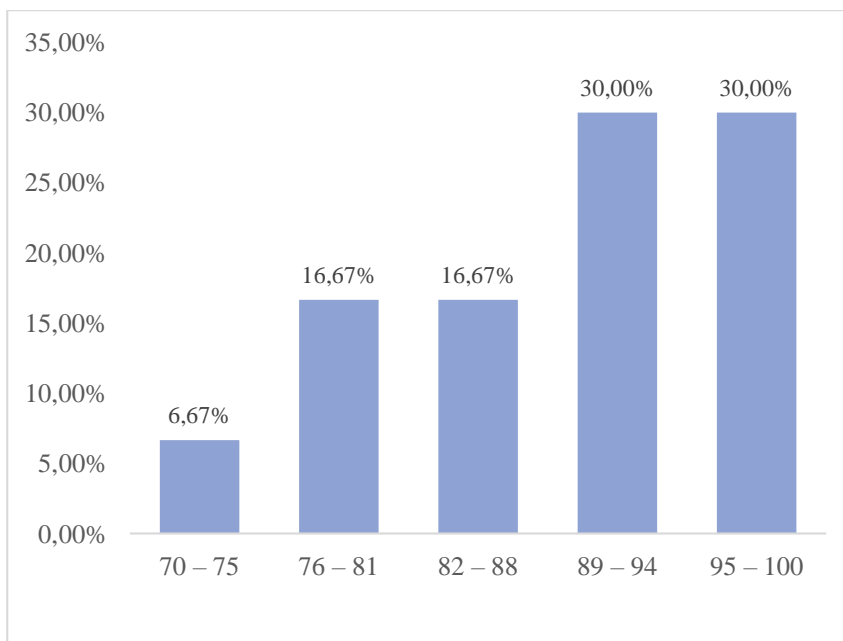
Descriptions of research results are also presented in frequency with the range of data (range) can be known by reducing the largest data with the smallest data in the group. The length of the class by the formula of the data range divided by the number of individuals. The description of the research results can be seen in the table below:

**Table 3.***Description of the results of the explosive power of the limb muscles*

No	Interval	Frekuensi	Presentase (%)
1	70 – 75	11	36,67 %
2	76 – 81	9	30,00 %
3	82 – 88	6	20,00 %
4	89 – 94	2	6,67 %
5	95 – 100	2	6,67 %
<b>Jumlah</b>		30	100 %

Source: processed data

When displayed in graphical form, it can be seen in the image below:

**Figure 1.***Graph of Limb Muscle Explosion*

Source: Primary Data

## a) Description of Shooting Ability Measurement results

The shooting measurement results are described using statistical analysis, the data description is presented in tabular form as follows:



**Table 4.***Description of Shooting Ability Test Results Data*

Item Test	N	Mean	Median	Modus	SD	Max	Min
Vertical Jump	30	7,4	8	8	1,90	10	4

Source: Primary Data

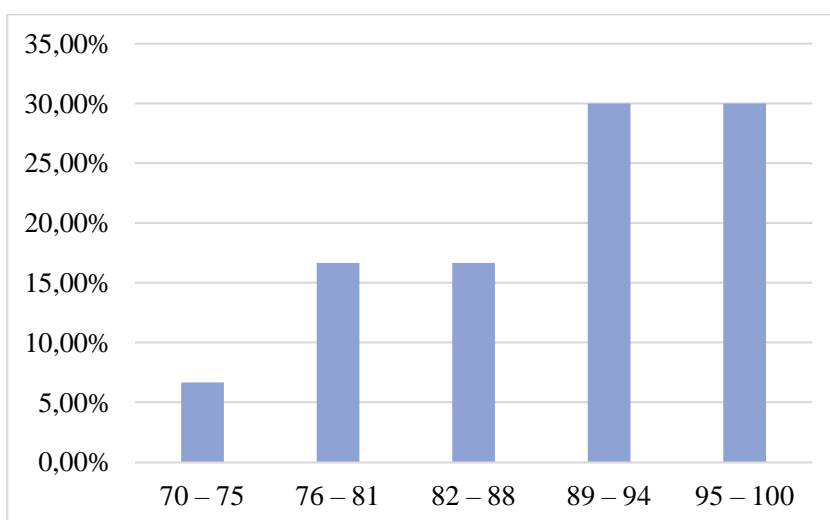
Descriptions of research results are also presented in frequency with the range of data (range) can be known by reducing the largest data with the smallest data in the group. The length of the class by the formula of the data range divided by the number of individuals. The description of the research results can be seen in the following table:

**Table 5.***Description of Explosive Power Measurement Results of the Limb Muscles*

No	Distance Interval	Frequency	Percentages (%)
1	1 – 2	2	6,67%
2	3 – 4	5	16,67%
3	5 – 6	5	16,67%
4	7 – 8	9	30,00%
5	9 – 10	9	30,00%
	Total	30	100%

Source: Primary Data

When displayed in graphical form, it can be seen in the image below:

**Figure 2.***Graph of Shooting Ability Results*

Source: Primary Data



## Requirements Analysis Test Results

Before carrying out statistical analysis, first the assumption test or analysis requirements test which includes normality test and linearity test is carried out. The use of the normality test is used to determine whether the distribution of the data obtained is normal or not, while the use of the linearity test is used to determine whether the research sample comes from a linear population.

### a) Normality test

Testing for normality using the Kolmogorof-Sminorv test. In this test, the sample hypothesis will be tested from a normally distributed population, to accept or reject the hypothesis by comparing the P-value with 0.05. The criteria accept the hypothesis if the P-value is greater than 0.05, if it does not meet these criteria, the hypothesis is rejected.

**Table 6.**

#### *Normality Test Calculation Results*

No	Variable	Sig.	Result
1	Leg muscle explosive power	0,054	Normal
2	Shooting ability	0,059	Normal

Source: Primary Data

From the table above the price of Sig. or the P-values of all variables are greater than 0.05 so that the hypothesis stating that the sample is based on a normally distributed population is accepted. From this information, the variable data in this study can be analyzed using a parametric statistical approach.

### b) Linearity Test

Linearity test is used to determine the nature of the linear relationship or not between the independent variable and the dependent variable, the regression is said to be linear if the F observation is smaller than F table. The results of the linearity test can be seen in the table below:

**Table 7.**

#### *Linearity Test Calculation Results*

	Significance	F table	F count	Conclusion
<i>shooting – leg muscle explosive power</i>	0,65	2,41	0,78	Linier

Source: Primary Data

From the results above, it is known that the two significance values are greater than 0.05 so it can be concluded that there is a linear relationship.

## Hypothesis Test Results

In analyzing the data, the author uses the computer-assisted SPSS For Windows 25.0 program, the technique used to test the hypothesis. From the results of the analysis obtained

results that can be seen from the table below:

**Table 8.**

*Hypothesis Testing Table*

Model	Coefficients <sup>a</sup>								
	Unstandardized Coefficients			Standardized Coefficients			Correlations		
	B	Std. Error	Beta	t	Sig.	Zero-order	Partial	Part	
1 (Constant)	18,765	3,975		4,721	,000				
x	,317	,050	,771	6,412	,000	,771	,771	,771	

a. Dependent Variable: y

Source: Primary Data

After doing simple regression analysis, the regression coefficient (R) is 0.771 and the coefficient of determination (R<sup>2</sup>) is 0.594, and the shooting ability coefficient (b<sub>1</sub>) is 0.317 and the constant number (a) is 3.975 when expressed in the following equation:

$$Y' = 3.975 + 0.317 X$$

Based on the above equation, it can be interpreted as follows: a = 3.975 is shooting ability (Y), if all independent variables (X) are equal to zero. B<sub>1</sub> = 0.317, the regression coefficient of the shooting ability variable is positive, meaning that if the explosive power of the leg muscles (X) is good, it will cause an increase in the shooting ability variable (Y) of 0.317 units.

The t test is used to determine the significant level of the influence of the independent variables on the dependent variable individually, it can be seen in table 7 that it is obtained that t count = 6.412 and t table = 2.048. From the results of the analysis, the t count is compared with the t table. If t count < t table, then H<sub>0</sub> is accepted and H<sub>a</sub> is rejected. Compared if t count > t table, then H<sub>0</sub> is rejected and H<sub>a</sub> is accepted. These results can be said to be significant, meaning that the hypothesis is accepted, which means that there is a significant relationship between leg muscle explosive power (x) shooting ability (y). While the magnitude of the influence given is 59.4%. This can be seen from the value (R<sup>2</sup>) of 0.594 on the coefficient of determination.

#### 4. DISCUSSIONS

The muscular system is intersected from several separate parts of each other called the muscles. A large part of our muscles are attached to the skeleton of the body. Muscles can constrict and also tighten muscle arrangements are a system of tools to master the active movement and position of our body. The definition of explosive power of limb muscles is the ability of limb muscles to carry out activities from several combinations of muscles to produce energy strongly and quickly. Kicking the ball is a basic technique of playing football quickly and precisely towards the target, both to friends and targets in making goals against the opponent. In reality successfully or not getting the ball into the goal requires not only explosive power but also precision. Try to practice kicking the ball often starting with kicking the ball straight. The kicking technique for each player is very important because it has a lot to do with the purpose of the

football game itself which is to put the ball into the opponent's goal. Without adequate mastery of kicking techniques, the goal of the football game is not achieved optimally.

The results showed that there was a significant relationship between the explosive power of leg muscles and shooting ability in club Futsal Ababil Purworejo. It is shown from the result  $t$  count = 6.412 and  $t$  table = 2.048. From the results of the analysis,  $t$  count is compared to  $t$  of the table. If  $t$  counts <  $t$  table, then  $H_0$  is accepted and  $H_a$  is rejected. Compared if  $t$  counts >  $t$  table, then  $H_0$  is rejected and  $H_a$  is accepted. These results can be said to be significant, meaning that the hypothesis is accepted which means that there is a significant relationship between the explosive power of the limb muscles ( $x$ ) shooting ability ( $y$ ). Meanwhile, the amount of relationship given was 59.4%. This is seen from the value ( $R^2$ ) of 0.594 on the coefficient of determination.

From the explanation above, it is clear that the explosive power of the limb muscles greatly affects the shooting results into the goal in the game of football. This can be seen from the results of the analysis calculations which state that there is a significant relationship between the explosive power of the limb muscles and the results of shooting into the goal determined from the results of the analysis obtained. This is also reinforced by previous research, the conclusion of this research is the contribution of limb explosive power and limb muscle strength to shooting ability in futsal games in State High School Students 1 Pinrang" from the study concluded that the shooting quality of students after increasing the use of the method of modifying training facilities in futsal games.

Explosive power is divided into two, namely strength and speed to perform maximum power and speed in a very fast and short time. Explosive power itself the ability to combine strength with speed in the form of the ability of muscles to cope with loads with a high contraction speed. Explosive power is also the ability to overcome loads/obstacles with a high speed of muscle contraction. Explosive power is the ability of muscles that combine strength and speed to cope with loads with high contracting muscles in a very short time. It can be concluded that the explosive power of the limb muscles is very dominant in affecting the shooting ability.

## 5. CONCLUSIONS

Based on the description of the results of the discussion in this study and from the data processing that has been carried out, it can be concluded that there is a very meaningful relationship between the explosive power of the limb muscles and the shooting ability of the Club Futsal Ababil Purworejo. Supporting data in addition to correlation, also found that rata-average explosive power of the player's limb muscles on Club Futsal Ababil Purworejo is 80, sreduce the average obtained player at the time of the ability test *Shooting* in futsal games is 7.4. The results of this study have implications for paying special attention to athletes, especially the explosive power of the leg muscles because they contribute to the ability to shoot futsal. Special attention can be the program Exercises for increased explosive power of limb muscles varied in certain Exercises. Based on the results of this study, it is recommended for coaches and futsal coaches to pay attention to the elements of explosive power of limb muscles in improving the ability of *Shooting* on the game of futsal. It is expected in other studies to be able to see several other factors that have not been considered in this study. Because in this study there are limitations on the research sample is still limited and the sample measurement is only in male students so it is recommended to other researchers who want to research the same in order to reproduce the

sample and involve the sample of female students in this study.

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