

# A Contribution of Leg Muscle Explosion Power and Flexibility to Football Shooting Accuracy

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## ABSTRACT

The construction of the physical condition of the construction as the dominant factor toward success in reaching the achievements of the summit. This research at the contribution of an explosive limb muscle and flexibility against the accuracy shooting soccer athletes PS UNP. The sample in this study amounted to 30 people who are active in the following exercise. Data retrieval is done by executing the test measurements, namely: (1) Test standing broad jump for an explosive limb muscle. (2) The test sit and reach for the flexibility. (3) The test for accuracy of shooting soccer, with a level of validity 0.65 and a level of reliability 0.77. Research on variable data analysis techniques using descriptive statistical analysis and frequency distribution is presented in the form of a table. The research states that: (1) an explosive limb muscles contribute significantly towards the accuracy shooting direction of the positive correlation of 0.71, with contributions amounting to 50.30%. (2) flexibility contributes significantly towards the accuracy shooting, direction of the positive correlation of 0.51, with contributions amounting to 25.97%. (3) Explosive limb muscles and flexibility together-the same contribute significantly towards the accuracy shooting soccer athletes PS UNP

**Keywords:** *Leg muscle explosion power, flexibility*

## 1. INTRODUCTION

Sport is not only for the sake of education, recreation, physical fitness, and as a profession and economy, but also as an arena for the formation of achievements that can elevate the nation's dignity. This is in accordance with what is explained in the Law on the National Sports System of the Republic of Indonesia Number: 3 of 2005. concerning the development and development of sports achievements in Article 27 Paragraph: 4 which states that: "Founding and developing sports achievements are carried out by empowering sports associations, develop sports coaching centers that are national and regional, and organizing competitions in stages and continuously" (UU RI No. 3, 2005).

The low sports performance achieved by Indonesian athletes in general is one of the consequences of the lack of guidance for athletes in sport branches in Indonesia. Also happens in football. The lack of coaching not only results in poor physical condition abilities, but also an impact on football technical abilities.

From so many branches of sports, one of them is football. What is proven not only in Indonesia, but the

world community is very fond of football. More than 200 million people worldwide play more than 20 million football games. To achieve good football achievements, In addition to regular, directed and continuous coaching and training efforts, the guidance should be directed to the development of physical conditions as the most dominant factor for success in achieving top achievements. As according to Hendri Irawadi (2011) divides "Elements of basic physical conditions into endurance, strength, speed, and flexibility. While elements of combined physical conditions include endurance strength, endurance speed, explosive power, agility, balance, speed of reaction, speed of action, speed and coordination". Besides having good physical, tactic, and mental condition, athletes are also required to have good technical mastery, because without good technical mastery, because without good technical mastery, an athlete cannot realize what he aspires.

The basic techniques in soccer include *dribbling, passing techniques, stopping techniques, shooting, heading balls, and throwing-in techniques*. (Gifford, 2007). The basic technique is one of the foundations that a person must have to be able to play football.

Technique is one of the elements that influences the success of a football athlete, especially the *shooting technique*. So that with good technique is expected that an athlete can achieve the desired achievement. *Shooting techniques* are needed by football athletes to put the ball in the opponent's goal as the end of the attack scheme. If you have good *shooting* skills, the chance of winning a match will be even greater.

Persatuan Sepabola Universitas Negeri Padang (PS UNP) in participating in a football tournament, they are always favorites to enter the semifinal and even final phases, but in recent years they have always been eliminated earlier. Based on the writer's knowledge and observations in the field, one of the problems they have is the *shooting technique* of PS UNP athletes who do not meet good results. From these observations it appears that the *shooting* of these athletes is inefficient, many of which lead out of the goal and even too slowly so that it is easily captured by the goal keeper.

This is certainly a problem because these players cannot maximize the opportunities available to produce a goal with poor *shooting*. Not yet the maximum results of this *shooting* may be influenced by several factors: lack of leg muscle explosive power, lack of flexibility, and lack of ankle coordination. From some of the factors outlined above, it is thought that the leg muscle explosive power factor and the flexural factor have the strongest influence. The explosive power of the leg muscles possessed by the athlete makes the resulting *shooting* have speed, so that the ball leads straight towards the specified direction, likewise the flexibility will make the angle of the body and the quality of the movements smooth, so that the body is not rigid when *shooting* techniques.

Based on the problems raised, the authors wish to examine the contribution of leg muscle explosive power and flexibility to shooting ability with the title of the study are: Contribution of Leg Muscle Explosion Power and Determination of Football *Shooting* Accuracy. This research tries to reveal the function of leg muscle explosive power and flexibility together to contribute to the ability to *shoot* accuracy.

Based on research variables, then the research hypothesis is formulated as follows: (1) Leg muscle explosive power contributes significantly to the *shooting* accuracy of PS UNP football athletes, (2) Waist flexibility contributes significantly to the *shooting* accuracy of PS UNP football athletes, (3) The explosive power of the leg muscles and the flexibility of the waist together contribute significantly to the *shooting* accuracy of PS UNP football athletes.

In achieving a successful football game, Dietrich, Knut, and Dietrich KJ, (1989) stated that "the key to success in winning football is a sport that relies on

cooperation between players in a team". Each player is required to help each other in supporting other players in a match. Cooperation in football is very important to win. As a player can not immediately win the victory in a short time, without going through a long process. To become a football player, we must have the basic skills and abilities in playing football, both in terms of kicking, passing, holding, heading, and shooting on goal.

On the other hand, Mielke (2007) further emphasized that "the goal of a football game is to shoot at goal to score as many goals as possible. A player must master the basic skills of kicking the ball by further developing a series of *shooting* techniques that allow him to carry out *shooting* kicks and score goals from various positions on the field.

Then (Luxbacher, 2001) adds "The main target in every attack is to score goals". To score against the opponent's goal, we are required to be able to perform *shooting* skills under the pressure of the game, limited time, physically tired and aggressive opponents. The existence of an opponent's goal kick is likely the goal will be created and is the main capital to win. In essence, each player must be able to kick the opponent's goal, a goal will be created if there is a goal kick.

Football can be classified into activities that are fundamental to skills. Because football not only involves the muscles needed to make precise and fast movements, but the technical and aesthetic nature is indirectly involved in it.

Muscle explosive power is a component of physical condition that is very important to be considered by coaches in improving football athlete performance, because the leg muscle explosive power is needed by football players to do kicks and jumps. Called *explosive power*, because the anaerobic work process that requires the fastest time and strong energy. This ability is a combination of strength and speed.

In the case of *explosive power*, Sajoto (1988) states "Explosive power is the ability of a person to exert maximum strength, with effort being expended in the shortest possible time". Besides that, Bafirman (2008) stated "explosive power is the ability to direct the power quickly in a short time to provide the best momentum for the body or object in a complete explosive movement to achieve the desired goal". When doing good techniques in soccer, it is very necessary to have leg muscle explosive power, especially *shooting* techniques.

A good *shooting* kick in football sports places great emphasis on good leg muscle explosiveness. If an athlete's leg muscle explosive power level is low when *shooting*, then the kicked ball does not have good power so it will be easily anticipated by the goalkeeper. But the

opposite, if an athlete has a good level of leg muscle explosive power during *shooting*, then the ball will fly quickly towards the target to be achieved.

"Flexibility is the ability of stretches or joints to be able to move in all directions with a large and wide *range of motion* amplitude in accordance with the function of the joints that are moved". And then Syafruddin (2011) also suggested that "The success of doing movements depends on the joint amplitude or area of movement that should exceed the flexibility required by the movement".

Furthermore, Syafruddin (2011) also argues that basically flexibility can be seen from several points of view, namely: (a) From the point of view of the needs of a sport can be divided into two, namely general flexibility (contributing to general body flexibility) and specific flexibility (related to the techniques performed in a sport). (b) Judging from the implementation can be grouped on active flexibility, passive flexibility and static flexibility and dynamic flexibility (related to the pattern of movement performed).

Flexibility is very important for an athlete to have, because it affects a person's skills in sports. Flexibility is a prerequisite for the performance of skills with high amplitude, and makes it easy for someone to make a move quickly. Flexibility also acts as an element to save energy expenditure when doing movements, reduce the likelihood of muscle and joint injuries and help improve the ideal posture.

Thus it is clear that flexibility plays a very large role in learning *shooting* skills and can optimize other physical abilities. Even flexibility is a very good element in determining the success of *shooting*. On the other hand, flexibility also largely determines the quality of one's shooting technique movements.

**2. RESEARCH METHODS**

This research is a research conducted using the correlation method. While the data generated is quantitative data, because the research data used are numbers. The correlation method was chosen in this research because the research aimed to reveal the magnitude of the contribution of one *variable* to another.

On the other hand, to determine the degree of relationship used *Product Moment* Correlation Statistics analysis. Before testing the hypothesis, the data analysis requirements test is performed with the data normality test (*Lilliefors test*) at a significance of 0.05 and the independence test.

The population in this research were 30 PS UNP athletes who were active in following the training. The sampling in this research using *Total Sampling*, because the population is less than 100, overall the population is

sampled as a research. Then determined the research sample of 30 people.

The research data were obtained using a *standing broad jump* test to measure the leg muscle explosive power. Flexibility Test using Sit to Raise the Toe (*Sit and Reach Test*), and to get the Accuracy Shooting data to the goal using the target soccer goal test. Validity 0.65 and Reliability level 0.77.

**3. RESULTS AND DISCUSSION**

Based on the results of tests conducted on samples in this research, data obtained from the leg muscle explosive power score, of 43.10 and the standard deviation of 4.61 with a range of scores between 30 and 52. For more details, see table 1.

**Table 1. Explosion Power Frequency Distribution Leg muscles**

NO	Interval Class	Frequency	
		Absolute	Relative(%)
1	30 - 33,7	1	3.33
2	33,8-37,5	2	6.67
3	37,6-41,3	7	23.33
4	41,4-45,1	10	33.33
5	45,2-48,9	7	23.33
6	49-52,7	3	10.00
	Score	30	100

For data flexibility, obtained a score of 2.43 and a standard deviation of 0.14 with a range of scores between 2.20 to 2.66, see table 2.

**Table 2. Frequency Distribution Flexibility**

Number	Interval Class	Frequency	
		Absolute	Relative(%)
1	2,2 - 2,28	6	20.00
2	2,29 - 2,37	4	13.33
3	2,38 - 2,46	8	26.67
4	2,47 - 2,55	6	20,00
5	2,56 - 2,64	4	13.33
6	2,65 - 2,73	2	6.67
	Score	30	100

As for the shooting accuracy data, the average is 9.70 and the standard deviation is 3.54 with a range of scores between 3 and 18. For more details, see table 3.

**Table 3. Results Frequency Distribution Shooting Accuracy Test**

Number	Interval Class	Frequency	
		Absolute	Relative(%)
1	3 - 5	2	6.67

2	6 - 8	11	36.67
3	9 - 11	9	30.00
4	12 - 14	4	13.33
5	15 - 17	3	10.00
6	18 -20	1	3.33
	Score	30	100

From the results obtained in advance the normality test was performed on the frequency distribution of the leg muscle explosive power variable scores ( $x_1$ ), flexibility ( $x_2$ ) and shooting accuracy ( $y$ ) are analyzed with Lilliefors and data are normally distributed if  $Lo < Lt$  and data are not normal if  $Lo > Lt$ . At  $\alpha = 0.01$  see table 4.

**Table . 4 Variable Normality Test for Shooting Determination and Accuracy**

No	Variable	Lo	Lt $\alpha = 0,01$	Information
1	Leg Muscle Explosion Power	0.0569	0.1870	Normal
2	Flexibility	0.0927	0.1870	Normal
3	Shooting accuracy	0.1793	0.1870	Normal

Independence test was analyzed using the statistical formula t arithmetic. Independent variable data has no relationship if t arithmetic  $< t$  table and data there is a relationship if t arithmetic  $> t$  table. At  $\alpha = 0.05$ . For more details, you can see a summary of the data independence test in table 5.

**Table. 5. Independence Test Summary**

No	Variable	t count	t table $\alpha = 0,05$	Information
1	Leg Muscle Explosion Power and Flexibility	2.74	2.763	There is no relationship between independent variables

After doing the data description, then the next step is to test the hypothesis by using the correlation coefficient between the independent variable and the dependent variable, which is the relationship between leg muscle explosive power ( $x_1$ ) free variable with shooting accuracy ( $y$ ) dependent variable. Based on the calculation results obtained by the coefficient between leg muscle explosive power variables ( $x_1$ ) with shooting accuracy ( $y$ ) or  $r_{x_1y}$  of 0.71 from the correlation results that have been known to be continued by testing the

significance of the correlation with the significance level  $\alpha = 0.05$ . In other words, there is a significant relationship between leg muscle explosive power and shooting accuracy based on the calculation of the coefficient of determination of 50.30%. See table 6.

**Table 6. List of Correlation Analysis Between Leg Muscle Explosion Score and Shooting Accuracy Score**

Correlation	r count	r table	D	t ratio	t table $\alpha = 0,05$	Conclusion
$r_{x_1y}$	0.71	0.361	50.30%	5.29	2.045	Significant

For the variable ( $x_2$ ) with shooting accuracy ( $y$ ) or  $r_{x_2y}$  of 0.51 from the known correlation results can be corrected by testing the significance of the correlation with the significance level  $\alpha = 0.05$ . It can be concluded that the proposed research hypothesis is accepted. In other words there is a significant relationship between flexibility and shooting accuracy at  $\alpha = 0.05$  based on the calculation of the coefficient of determination 25.97%.

**Table 7. List of Correlation Analysis Between the Determination Score and the Shooting Accuracy score.**

Correlation	r count	r table	D	t ratio	t table $\alpha = 0,05$	Conclusion
$r_{x_2y}$	0.51	0.361	25.97	3.14	2.045	Significant

On the other hand, for leg muscle explosive power variable ( $x_1$ ), flexibility ( $x_2$ ) with shooting accuracy ( $y$ ), it can be  $r_{x_1x_2}$  of 0.46. From the results of the correlation that has been known to be continued by testing the significance of the correlation with the significance level  $\alpha = 0.05$ . On variables ( $r_{x_1x_2}$ ), if the calculated value is greater than the value  $r_{table}$  ( $r_{count} > r_{table}$ ).  $2,74 < 2,763$ . Based on this the correlation coefficient  $x_1$  and  $x_2$  are insignificant. Based on value  $r_{table}$  at the level of significance  $\alpha = 0,05$  with  $n = 30$  was obtained  $r_{table}$  of 0,46. because value  $r_{count}$  smaller than the  $r_{table}$  value means the correlation coefficient between variables  $x_1, x_2$  is not significant.

**Table 8. List of Correlation Analysis Between Leg Muscle Explosion Score and Flexibility**

Correlation	r count	r table	D	t ratio	t <sub>table</sub> α = 0,05	Conclusion
r <sub>X<sub>1,2</sub></sub>	0.46	0.361	21.28	2.74	2.763	Insignificant

After knowing the bivariate coefficient of each variable is significant, the next step is to test the significance of the multiple correlation coefficient by testing F, based on the F test results obtained as presented in table 12 as follows.

**Table 9. Test of Significance of Multiple Correlations**

Variable	R	F <sub>count</sub>	F <sub>Table</sub>	Conclusion
X <sub>12</sub> and Y	0.89	50.3	3.32	Significant

Based on the list of distribution of F with dk numerator 2, dk denominator 30, Significant level α = 0.05 obtained F<sub>table</sub> of 3.32. because F<sub>count</sub> is greater than F<sub>table</sub> (50.3 > 3.32).

Therefore it can be concluded, that the multiple correlation coefficient between x<sub>1</sub> and x<sub>2</sub> with Y is **significant** between the **Leg Muscle Explosion variable** (x<sub>1</sub>), **Flexibility** (x<sub>2</sub>) with **Shooting Accuracy**.

After the multiple correlation coefficient value is known and tested the significance of the correlation coefficient, then the next step is to determine the magnitude of the coefficient of determination. Based on the calculation results the coefficient of determination was 78.84%. This means that the contribution of single muscle explosive power and flexibility to shooting accuracy in PS UNP athletes is 78.84% while the remaining 21.16% is influenced by other variables such as coordination, technique and others. With the addition of the linear multiple regression equation for the two predictors  $Y = -27.48 + 0.3 X_1 + 5.9 X_2$ .

Based on the results of the analysis stated above, it turns out that the alternative hypothesis being proposed is accepted as correct (there is a significant relationship), further discussion will be put forward in connection with the acceptance of the hypothesis. From the results of the analysis that has been proposed for testing the hypothesis of this variable shows a positive relationship and mutual success of an athlete in scoring goals depends on several factors, especially the ability of a person to make a powerful and accurate shot using both feet. The strength of the kick is marked by the rapid pace of the ball. With maximum speed, the defender will fail to hold a disturbance. This will be a

determination in shooting accuracy, if the opponent's goal keeper fails to maintain the goal, especially if the athlete is shooting far from his range.

In accordance with the idea of playing football, to score as many goals as possible against the opponent's goal and defend the goal from being broken. So when there is an opportunity for athletes to kick in front of the opponent's goal, each kick must have a fast ball speed and have the right accuracy too.

Supporting this theory, the leg muscle explosive power must be possessed by athletes, so the trainer must be able to create an exercise program to improve it. There are various forms of exercise in increasing the explosive power of an athlete's leg muscles, which can be done using a ball or without a ball. The trainer must know the characteristics of explosive power training, so as to give birth to variations in the various exercises. Thus athletes will be motivated when training and avoid the boredom while practicing.

In addition, flexibility also plays an important role in the implementation of basic techniques, including when shooting accuracy. Because the kick towards the opponent's goal must be done with any foot, from all angles and positions. In order to be able to make a kick with all angles and positions, then flexibility is the main condition in producing good techniques. Athletes who have good flexibility will be able to kick from any angle. Because if you don't have flexibility, the implementation of the shooting accuracy technique will be stiff. Because flexibility can provide broad, effective and efficient movements.

On the other hand, the athlete's goal when attacking is to shoot at the opponent's goal, because scoring goals is the most important part in football. Thus the athlete must master the basic skills of kicking the ball and develop *shooting* techniques to score goals from various positions on the field. The right way to develop shooting techniques is to practice *shooting* kicks repeatedly using the correct techniques.

The main basis of *shooting accuracy* is the correct implementation of techniques according to their phases (Preparation, Implementation, *Follow-Through*). After the technique is correct, the physical condition factor must be trained in supporting the success of the technique. It is expected that the ball moves with high speed and has the right accuracy.

Support for leg muscle explosive power in *shooting* is also important, this will create the athlete's opportunity to shoot in front of the opponent's goal and score a goal. If the shooting distance is far, and there is a chance for shooting, then the leg muscle explosive power is needed in conditions like this.

The efficiency and effectiveness of good techniques can be produced if the athlete has good

flexibility. Because in a match, attacking players will always look for opportunities to make kicks into the goal. Thus, *shooting* will be created in any position and at any angle, provided that the shooting opportunity exists. Based on this, there is a significant contribution together between leg muscle explosive power and flexibility to the *shooting accuracy* of PS UNP athletes.

#### **4. CONCLUSIONS AND SUGGESTIONS**

##### *A. Conclusions*

Hypothesis testing results, produce the following conclusions: (1) Leg muscle explosive power contributes significantly to the accuracy of *shooting* athletes of the Football Association of Universitas Negeri Padang (PS UNP). The direction of the positive correlation is 0.71, with a contribution of 50.30%. Addition to the regression equation  $\hat{Y} = a + bX_1 = -13,80 + 0.55 X_1$  Linear and significant regression. (2) Waist flexibility contributes significantly to the shooting accuracy of the Football Association of Universitas Negeri Padang (PS UNP). The direction of the positive correlation was 0.51, with a contribution of 25.97%. Addition to the regression equation  $\hat{Y} = a + bX_1 = -21,85 + 12,99 X_2$  linear and significant regression. (3) The leg muscle explosive power and flexibility of the joint together make a significant contribution to the *shooting accuracy* of PS UNP football athletes. With the addition of multiple linear regression equations for two predictors  $Y = -27.48 + 0.3 X_1 + 5,9 X_2$

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