



The Contribution of Leg Muscle Strength and Balance to Shooting Accuracy in UIR Soccer School (USS) Under 17 Athletes

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Abstract: This type of research is a multiple correlation. The population in this study is the Under 17 athletes from UIR Soccer School (USS), totaling 22 athletes. The sampling technique used in this research is the entire sample, with a total of 22 athletes. The test instruments used are the leg dynamometer test, passive balance test, and Shooting test. The data analysis technique used is the r-test. Based on the calculation results, it can be seen that (1) there is a contribution of leg muscle strength to the accuracy of Shooting in the Under 17 athletes from UIR Soccer School (USS) with an r-value of 0.521581 and a contribution of 27.20%, (2) there is a contribution of balance to the accuracy of Shooting in the Under 17 athletes from UIR Soccer School (USS) with an r-value of 0.517984 and a determinant contribution of 26.83%, (3) there is a contribution of strength and balance to the accuracy of Shooting in the Under 17 athletes from UIR Soccer School (USS) with an r-value of 0.735092 or a determinant contribution of 54.03%.

Keywords: *Limb Muscle Strength, Balance, & Shooting Accuracy*

Abstrak: Jenis penelitian ini merupakan penelitian korelasional ganda. Populasi dalam penelitian ini adalah atlet U-17 Sekolah Sepakbola UIR (USS) yang berjumlah 22 atlet, dengan teknik pengambilan sampel menggunakan total sampling, sehingga seluruh populasi dijadikan sampel penelitian. Instrumen yang digunakan meliputi tes leg dynamometer untuk mengukur kekuatan otot tungkai, tes keseimbangan pasif, dan tes Shooting. Teknik analisis data yang digunakan adalah uji korelasi (uji r). Hasil penelitian menunjukkan bahwa terdapat kontribusi kekuatan otot tungkai terhadap ketepatan Shooting dengan nilai $r = 0,521581$ dan kontribusi sebesar 27,20%, serta kontribusi keseimbangan terhadap ketepatan Shooting dengan nilai $r = 0,517984$ dan kontribusi determinan sebesar 26,83%. Selain itu, secara bersama-sama kekuatan otot tungkai dan keseimbangan memberikan kontribusi terhadap ketepatan Shooting dengan nilai $r = 0,735092$ atau kontribusi determinan sebesar 54,03%.

Kata Kunci: *Kekuatan Otot Tungkai, Keseimbangan, dan Ketepatan Shooting*

Introduction

Playing soccer certainly requires mastering basic techniques. Without them, the game of soccer cannot be played well and effectively. So, in soccer, there are many basic techniques that need to be mastered, including dribbling the ball, passing the ball, heading the ball, and shooting the ball. These basic techniques are crucial to facilitate proper and effective gameplay. Dribbling involves moving the ball with the feet to pass opponents and find open spaces. Passing the ball is a fundamental soccer technique aimed at giving the ball to a teammate and creating space for more effective gameplay. Meanwhile, shooting aims to kick the ball into the goal. Good shooting or accurate shooting provides optimal results for the team. There are several factors that influence shooting, with the most dominant ones being leg muscle strength and balance. Leg muscle strength is one of the factors that affect an athlete's shooting. If an athlete does not have good leg muscle strength, it will greatly affect their kicking ability. Therefore, leg muscle strength should be trained frequently and correctly. Balance is another factor that affects an athlete's shooting. If an athlete does not have good balance, their shots will miss the designated target. Thus, it can be concluded that shooting performed by athletes is greatly influenced by leg muscle strength and balance.

In addition to preparing the basic techniques in soccer, there are several supporting elements that can make these techniques work effectively, such as the physical aspect for athletes. This aspect is crucial in soccer, as without it, all the basic soccer techniques cannot be executed properly. The physical aspect includes strength, speed, agility, balance, endurance, and many others.

(Hidayat, 2023) Leg muscle strength refers to the ability of muscles to handle a load during work, which is generated by muscle contractions in the legs to support movement. Strength is an important physical condition that needs to be trained beforehand because it plays a vital role in protecting athletes from injuries and

ensuring joint stability. In the context of soccer, leg muscle strength used in kicking the ball is dynamic muscle strength, where muscles play a role in moving an object from one place to another. From the above definitions, it can be concluded that strength refers to the ability of muscles or a group of muscles to overcome a load or resistance during training activities. Strength is essential for athletes in all sports disciplines. Leg muscle strength is an important component of physical fitness because the level of adaptation depends on the proportion of muscle fiber quality and quantity. Strength can be interpreted as the quality of muscle force or a group of muscles in generating maximal contractions to overcome both internal and external loads. Therefore, the movements performed by the leg muscles result in activities such as kicking, running, jumping, and more. These movements are necessary in sports, especially those that predominantly involve the use of legs, such as soccer, martial arts, cycling, and others.

(Luxbacher. Joseph A, 2011) Balance is the ability to maintain the proper body position while performing movements. It relies on the integration between visual perception, the balance center, and muscle activity. Balance plays a crucial role in maintaining body equilibrium in both static and dynamic conditions, using minimal muscle activity. It can be defined as the relative ability to control the body's center of mass or gravity in relation to the base of support. Balance is important because it allows individuals to react accurately and efficiently to maintain postural stability before, during, and after movements, as well as in response to external disturbances. There are two types of balance: static balance and dynamic balance. Static balance refers to the ability to maintain balance in a stationary position, while dynamic balance refers to the ability to maintain balance during movement, such as running, walking, jumping, and more. Balance is an essential ability used in daily activities, walking, running, and some sports and games. It is also related to the ability to control the neuromuscular organs.

(Hidayat, 2023), Shooting is one of the fundamental techniques in soccer. All players must possess shooting skills. Shooting requires both strength and balance, as they greatly influence the accuracy of a kick.

Shooting is one of the most influential characteristics in soccer. Players who cannot shoot well will disadvantage their team as it becomes difficult to score goals against the opposing team. Therefore, in shooting, it is important to pay attention to the basic movements, such as the initial stance, execution, follow-through, as well as the position of the legs, arms, body, and head or gaze, to achieve optimal results. Based on the above opinions, shooting is a technical movement in soccer that involves striking the ball with the instep of the foot, aiming it towards the opponent's goal to score a goal. Accuracy in shooting is one of the basic techniques in soccer that is quite challenging, especially for less skilled players. The goal in soccer is to create accurate shots and score points on every opportunity, which is a prerequisite for a winning team. Therefore, mastering the fundamental shooting technique in soccer is essential. However, athletes should not neglect the mastery of other basic techniques. The success rate of scoring goals can be influenced by the habit and mastery of shooting techniques

Methods

Research Design

The type of research used in this study is correlational research, which compares the measurement results of two different variables to determine the level of relationship between these variables (Arikunto, 2010: 271). According to Sugiyono (2010: 228), the correlation technique used in finding and proving the hypothesis of the relationship between two or more variables is the same. In this study, the independent variables (X1) are leg muscle strength and (X2) is balance, while the dependent variable (Y) is the accuracy of shooting.

Sampling Procedures

According to Sugiono (2013: 215), the population refers to the generalization consisting of objects or subjects that have certain qualities and characteristics determined by the researcher for study and drawing conclusions. The population is the entirety of the research objects studied by the researcher. In this study, the population is the Under-17 athletes of UIR

Soccer School (USS), totaling 22 athletes. The sample is a subset of the population that is chosen for research. The researcher selected the entire population as the sample using total sampling technique. Therefore, it is known that the sample in this study consists of 22 athletes from USS Under-17.

Materials and Apparatus

Arikunto (2010: 150) defines a test as a series of questions or exercises and other tools used to measure skills, knowledge, intelligence, abilities, or talents possessed by individuals or groups. The tests and measurements conducted in this study include shooting tests, leg muscle strength tests, and balance tests.

Procedures

Sample Selection: The population for this study comprised athletes from UIR Soccer School (USS) Under-17. A total of 22 athletes were selected as the sample, using a total sampling technique. This method ensured that all eligible athletes from the population were included in the study.

Data Collection: The data collection process involved three types of tests: leg muscle strength, balance, and shooting accuracy. The leg muscle strength test was conducted using a dynamometer, while the balance test was performed using a specific balance assessment tool. Shooting accuracy was evaluated based on the athlete's ability to accurately shoot the ball towards the goal.

Data Analysis: The collected data were analyzed using correlation analysis to determine the relationship between leg muscle strength, balance, and shooting accuracy. The correlation coefficient (r) was calculated to assess the strength and direction of the relationships. Additionally, contribution values were calculated to determine the extent of each variable's influence on shooting accuracy.

Statistical Interpretation: The calculated correlation coefficients were compared to the critical values (t -tabel) to determine the significance of the relationships. If the calculated values were equal to or greater than the critical values, it indicated a significant correlation. The contribution values were then interpreted to assess the extent of the variables' impact on shooting accuracy.

Reporting and Documentation: The findings were presented in the form of tables, summarizing the results of each test and the correlations between variables. The results were discussed and interpreted in the context of the research objectives. Finally, the procedures and results were documented in a

comprehensive report.

It is important to note that the procedures outlined above are a general overview and may be customized based on the specific requirements of the research design and methodology.

Design or Data Analysis

To analyze the data, correlation analysis was performed. Correlation analysis is a statistical technique used to measure the strength and direction of the relationship between two or more variables. In this study, the correlation coefficient (r) was calculated to determine the degree of association between leg muscle strength, balance, and shooting accuracy.

Result and Discussion

1. Leg Muscle Strength (X1) in Under-17 Athletes from UIR Soccer School (USS)

Based on the results of the leg muscle strength test in Under-17 athletes from UIR Soccer School (USS), the data can be presented in Table 1:

Table 1. Leg Muscle Strength Test Results

NO	Class Interval	Frequency Absolute	Relative Frequency
1	39,734 - 46,451	12	54,54%
2	46,452 - 53,168	4	18,18%
3	53,169 - 59,886	2	9,09%
4	59,887 - 66,603	2	9,09%
5	66,604 - 73,322	2	9,09%
Total		22	100%

2. Balance (X2) in Under-17 Athletes from UIR Soccer School (USS)

After conducting the balance test, the lowest balance test score achieved by the Under-17 athletes from UIR Soccer School (USS) can be presented in Table 2:

Table 2. Balance Test Results

NO	Class Interval	Frequency Absolute	Relative Frequency
1	37,842 - 44,114	8	36,36364
2	44,115 - 50,387	7	31,81818
3	50,388 - 56,660	1	4,545455
4	56,661 - 62,933	2	9,090909
5	62,934 - 69,207	4	18,18182
		22	100%

3. Shooting Accuracy (Y) in Under-17 Athletes from UIR Soccer School (USS)

The results of the shooting accuracy calculation can be presented in Table 3:

Table 3. Shooting Accuracy Test Results

NO	Class Interval	Frequency Absolute	Relative Frequency
1	37,628 - 43,587	6	27,7%
2	43,588 - 49,547	7	31,81%
3	49,548 - 55,507	2	9,09%
4	55,508 - 61,467	2	9,09%
5	61,468 - 67,429	5	22,72%
		22	100%

a. Contribution of Leg Muscle Strength to Shooting Accuracy in Under-17 Athletes from UIR Soccer School (USS)

From the calculation results, the correlation coefficient (r) between leg muscle strength and shooting accuracy in Under-17 athletes from UIR Soccer School (USS) is found to be 0.521581, which is greater than the critical value (r_{table}) of 0.422. This indicates a moderate level of correlation. The contribution of leg muscle strength to shooting accuracy is 27.20% (KD), as shown in Table 4.

Table 4. Contribution of Leg Muscle Strength to Shooting Accuracy

Variable	R X1Y	R tabel	KD	Category	Description
X1to Y	0,521581	0,422	27,20%	Moderate	Significant

b. Contribution of Balance to Shooting Accuracy in Under-17 Athletes from UIR Soccer School (USS)

The correlation coefficient (r) between balance and shooting accuracy in Under-17 athletes from UIR Soccer School (USS) is found to be 0.517984, which is greater than the critical value (r_{tabel}) of 0.422. This indicates a moderate level of correlation. The contribution of balance to shooting accuracy is 26.83% (KD), as shown in Table 5.

Table 5. Contribution of Balance to Shooting Accuracy

Variable	RX2Y	R tabel	KD	Category	Description
X2 to Y	0,517984	0,422	26,83%	Moderate	Significant

c. Contribution of Leg Muscle Strength and Balance to Shooting Ability in Under-17 Athletes from UIR Soccer School (USS)

The correlation coefficient (r) between leg muscle strength, balance, and shooting accuracy in Under-17 athletes from UIR Soccer School (USS) is found to be 0.735092, which is greater than the critical value (r_{tabel}) of 0.422. This indicates a strong level of correlation. The contribution of leg muscle strength and balance to shooting accuracy is 54.03% (KD), as shown in Table 6.

Table 6. Contribution of Leg Muscle Strength and Balance to Shooting Ability

Variable	RX1X2Y	R tabel	KD	Category	Description
X1, X2 to Y	0,735092	0,422	54,03%	Strong	Significant

DISCUSSION

The results of this study reveal significant contributions of leg muscle strength and balance to shooting accuracy in Under-17 athletes from UIR Soccer School (USS). Both variables demonstrated moderate correlations with shooting accuracy, indicating their importance in achieving optimal performance in this aspect of the game. Firstly, the analysis showed a positive correlation between leg muscle strength and shooting accuracy. The calculated correlation coefficient (r) of

0.521581 indicates a moderate relationship between these variables. This finding suggests that athletes with greater leg muscle strength tend to exhibit higher levels of shooting accuracy. The contribution value of 27.20% further supports the significance of leg muscle strength in enhancing shooting performance. Secondly, the study found a significant correlation between balance and shooting accuracy among the athletes. The correlation coefficient (r) of 0.517984 indicates a moderate relationship between these variables. Athletes with better balance demonstrated higher levels of shooting accuracy. The contribution value of 26.83% highlights the importance of balance in achieving precise shooting.

Moreover, when considering the combined influence of leg muscle strength and balance on shooting accuracy, the analysis revealed a strong correlation. The calculated correlation coefficient (r) of 0.735092 indicates a robust relationship between these variables. The contribution value of 54.03% emphasizes the substantial impact of leg muscle strength and balance in determining shooting accuracy. Athletes who possess both qualities are more likely to exhibit superior shooting skills. Overall, these findings highlight the significance of leg muscle strength and balance in the shooting abilities of Under-17 athletes from UIR Soccer School (USS). Coaches and trainers should incorporate targeted training programs to enhance leg muscle strength and balance, aiming to optimize shooting accuracy among these athletes. By improving these physical attributes, athletes can potentially enhance their overall performance in the game of soccer.

It is important to note that this study focused solely on the correlation between leg muscle strength, balance, and shooting accuracy. Other factors such as technique, decision-making, and tactical awareness were not explored in this research. Future studies may consider examining the combined influence of multiple variables on shooting performance to gain a more comprehensive understanding of the factors affecting shooting accuracy in soccer.

CONCLUSION

There is a contribution of leg muscle strength to shooting accuracy in under -1 athletes from UIR Soccer School (USS) with a calculated value (r) of $0.521581 \geq$ the critical value of 0.422, and contribution value of 27.20%. There is a contribution of balance to shooting accuracy in under -1 athletes from UIR

Soccer School (USS) with a calculated value (r) of $0.517984 \geq$ the critical value of 0.422 and a contribution value of 26.83%. There is a contribution of leg muscle strength and balance to shooting accuracy in under-17 athletes from UIR Soccer School (USS) with a calculated value (r) of $0.735092 \geq$ the critical value of 0.422 and a contribution value of 54.03%

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