

## Correlation of Balance, Coordination, and Power of Leg Muscles to the Quality of Shooting Ability in Futsal Games



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**ABSTRACT:** Shooting technique is a basic determining technique in futsal to get victory points. The ability to measure shooting techniques requires important component elements, one of which is balance, coordination, and leg muscle power. This study aims to determine the correlation of balance, coordination, and leg muscle power to the quality of shooting ability using the instep in futsal games. This research is a correlational research. This study was conducted with subjects totaling 20 athletes from the Escape FC team. The instruments used in this study were coordination tests using the Soccer Wall Volley Test, balance using the Modified Bass Test, leg muscle power using Standing Broad or Long Jump and shooting skills using the target area of the shooting skill test. Data analysis techniques in this study using simple correlation test analysis using the product moment correlation formula and multiple correlation using regression line equations. Based on the results of this study showed: (1) the relationship between coordination on futsal shooting ability using instep R of 0.623 with sig value. of 0.003, (2) the relationship between balance and futsal shooting ability using instep R of 0.472 with sig value. of 0.002, (3) the relationship between leg muscle power and futsal shooting ability using instep R of 0.045 with sig value. of 0.000. (4) the relationship between coordination, balance, and leg muscle power on the ability to shoot futsal using the instep R of 0.809,  $R^2$  of 0.654 with a sig value. amounted to 0.001. So it can be concluded that the relationship between coordination, balance, and leg muscle power with the ability to shoot futsal using the instep in futsal sports is significant.

**KEYWORDS:** Correlation, Balance, Coordination, Limb Power, Shooting, Futsal.

### I. INTRODUCTION

Futsal is one of the team sports that is very popular with all levels of society in this world [1]. This is inseparable from survey data which found that futsal game fans year by year are increasing [2]. Fans of this game are not only the professional sports community, but all levels of society in the world both old, young, teenagers and children can play this game [3]. Futsal can be played by anyone, both men and women, both young and old. Games not only highlight physical condition, but can promote physical, mental, and social growth gradually towards maturity [4]. The game of futsal is currently experiencing a very rapid development, as evidenced by the emergence of professional and amateur futsal clubs and futsal athletes both at school and college levels [5]. This is also supported by the frequent holding of tournaments between clubs and tiered events both regional, city, provincial, national and even international.

The game of futsal in Indonesia has experienced a very rapid development [6]. This is characterized by futsal infrastructure facilities in various cities and corners of the country. This is a sign that Indonesian people are starting to like futsal games. Since futsal was invented by Juan Carlos Ceriani in Uruguay in 1930, futsal has become a phenomenon in itself for football lovers [7]. In Indonesia, futsal is generally played around the 2000s, but lately futsal has become a phenomenon for many people, especially urban and rural [8].

Since futsal developed in Indonesia, a special institution that manages futsal began to be established, namely the National Futsal Agency (BFN) under the auspices of PSSI [9]. Futsal is actually a complex sport, because it requires special techniques and tactics [10]. A futsal player should be able to master the basic techniques in the game of futsal [11]. A player must be equipped with good basic technique, players who have good basic technique the player tends to be able to play futsal well [12]. There are several basic techniques in futsal games, such as receiving, shooting, passing, chipping, heading, and dribbling [13]. In addition, each futsal player must also be equipped in terms of physical condition, because futsal games have differences from other sports

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[14]. The characteristics of futsal sport are that it requires endurance speed, endurance, coordination, strength, and agility for a relatively long time [15].

There are various techniques and movements that players can do on the field, so that on the field there are various combinations of techniques and movements that greatly support players in possession of the ball to achieve a victory [16]. In reality on the field, futsal games are dominated by ball possession, fast passing between players and good shooting skills [17]. Such as, a professional futsal team can control the ball very well, fast ball flow, accurate passing, dribble well, shooting well, supporting each other's teammates, opening space for movement, solid cooperation, and also individual skills possessed by players make this team a good team [18].

In futsal games, the dominant thing done is kicking, namely passing and shooting or shooting [19]. This technique is a young cloud to do, but in reality a player needs concentration and the right time to shoot the goal as the main target. Shooting is a powerful weapon to score as many goals as possible against the opponent [20]. Shooting techniques in futsal games can be done in various ways including using the instep, toe, inner foot, outer instep and using the heel [21]. But the very dominant part of shooting is with the instep, because the instep of a player is more effective in various sides such as hard, accurate and very high scoring opportunities [22].

Shooting that has good quality, a futsal player must have complex movement abilities [23]. In addition, a player shoots with him, must have good physical abilities, of course when a player performs shooting techniques under the pressure of the game, tight space, tired physique, and limited time [24]. Physique is the basis of sportsman achievement, because technique, tactics, and mentality will be well developed if they have good physical qualities [25], [26]. Based on the observations of researchers and interviews with 6 professional futsal coaches, what a futsal athlete really needs is to have good coordination, balance, and leg muscle power. So that under no circumstances does an athlete experience a decrease in quality in all aspects.

The factors that cause the lack of maximum shooting accuracy in futsal games are the lack of awareness of the athlete to practice the basic technique of shooting the ball into the goal. Futsal games are not about basic techniques and good futsal playing techniques, but there are still other important elements, namely elements of physical ability consisting of strength, endurance, explosive power, speed, flexibility, agility, coordination, and balance. Motor skills that support the implementation of football are numerous, including coordination, agility, flexibility, speed, and balance [27]. " Talking about the physique of a futsal player, then we are talking about the basic components for an athlete [28].

To achieve maximum results in the accuracy of shooting, it is necessary to increase coordination training, because training in this component is very important and must be owned by a futsal player. The better the eye and foot coordination, the better the shooting accuracy [29]. In general, it is because coordination is needed in every form of movement in sports. In particular, in futsal a player is required to perform very complex movements [30]. Such highly complex movements can be performed well if a player has good coordination of eyes, hands, feet, and all parts of the body [31].

Shooting in futsal requires people to have a good balance [32]. That's because in shooting a player only rests on one foot and the other foot swings to kick the ball with the help of hands to maintain body balance. Leg muscle power is needed to support the foot to have the ability to kick the ball hard [33]. The rapid flow of the ball kicked by the player, will make it more difficult for the opposing goalkeeper to block the ball, so the chance of a goal will be greater [34].

However, the reality is that the students who participated in the UNY futsal community were not good at shooting. There are still many students who are not precise and less hard in shooting. This can also be seen from every match conducted by the Yogyakarta State University futsal team both in sparring and tournaments. Although they often win every game, the players are still not good at finishing. Many players' kicks are still not on target (goal). For example, during the PORDA DIY 2022 match. The players played representing each district, almost 95% were students of the UNY futsal community (Sleman Regency), the players finished the match, passed the ball well and pedeteration well, but the final finishing with more shooting did not have the strength and was on target. Thus, it can be concluded that the futsal players of Yogyakarta State University are still lacking in shooting, so this research needs to be done.

## II. MATERIAL AND METHOD

This research is a correlational research. The method used is a survey with data collection techniques using tests and measurements. The survey method is an investigation conducted to obtain facts from existing symptoms and look for factual deficiencies. This study aims to determine whether there is a relationship between balance (X1), coordination (X2), leg muscle power (X3) and the ability to shoot using the instep in futsal (Y).

The population used in this study was 20 UNY futsal players. The nature of sampling in this study was carried out by means of Total Sampling technique. So that the sample in this study amounted to 20 people. Data collection methods are important in research because this method is a strategy or method used by researchers to collect data needed for their research, including:

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Observation, Interviews, and Documentation. The instrument in this study, in the coordination test using the soccer wall volley test, then in the balance test using a modified bass test aims to measure dynamic balance, in this leg muscle power test using standing broad or long jump aims to measure the power of the legs forward. Standing broad or long jump test quoted by Ismaryanti (2006: 51). And the shooting skill test, researchers conducted a drill shoot test of 10 shooting kicks using the instep.

The validity and reliability of the instrument is needed so that the research instrument is considered valid and feasible to assess the subject matter, so based on the results of the validity and reliability test above, the research instrument used found a validity result of 0.667 and reliability of 0.867. Data analysis in research there are two types of data analysis that can be used, namely statistical data analysis and non-statistical analysis using prerequisite tests: Normality test and linearity test, and hypothesis test using Product Moment Correlation test.

### III. RESULT AND DISCUSSION

#### Result

The results of this study will explain the general description of the results that have been obtained on the Correlation of Balance, Coordination, and Power of Leg Muscles to the Quality of Shooting Ability in Futsal Games, related to the results of the study will be explained in more detail in the results of analysis and discussion.

#### 1. Balance

The equilibrium is denoted by X1, obtained a maximum score of 90, a minimum score of 60, Mean obtained at 69.90, Standard deviation obtained at 9.947. The description of the results of the balance research is presented in the following table.

**Table 1. Descriptive Statistical Balance**

<b>Mean</b>	69,90
<b>Median</b>	65
<b>Modus</b>	65
<b>Stabdar Deviasi</b>	9,947
<b>Minimum</b>	60
<b>Maximum</b>	90

#### 2. Coordination

Coordination is denoted by X2, obtained a maximum score of 19, a minimum score of 15, a Mean of 17.65, a Standard deviation of 1.348, and a Median of 18. The description of the results of coordination research is presented in the following table.

**Table 2. Descriptive Statistical Coordination**

<b>Mean</b>	17,65
<b>Median</b>	18
<b>Modus</b>	18
<b>Standar Deviasi</b>	1,348
<b>Minimum</b>	15
<b>Maximum</b>	19

#### 3. Power Leg Muscles

Limb Power is denoted by X3, obtained a maximum score of 1.92, a minimum score of 1.77, a Mean of 1.82, a Standard deviation of 0.0387, and a Median of 1.82. Description of the results of limb power research is presented in the following table.

**Table 3. Descriptive Limb Muscle Power Statistics**

<b>Mean</b>	1,82
<b>Median</b>	1,82
<b>Modus</b>	1,82
<b>Standar Deviasi</b>	0,387
<b>Minimum</b>	1,77
<b>Maximum</b>	1,92

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### 4. Shooting Capability

Data from research on the relationship between Balance, Coordination, and Limb Power on Shooting Ability that have been analyzed with the SPSS 25.0 for windows program, obtained a maximum score of 25, a minimum score of 17, a Mean of 20.15, a Standard deviation of 2.815, and a Median of 20. The description of the results of the Shooting Capability research is presented in the following table.

**Table 4. Descriptive Statistical Shooting Ability**

<b>Mean</b>	20,15
<b>Median</b>	20
<b>Modus</b>	18
<b>Standar Deviasi</b>	2,815
<b>Minimum</b>	17
<b>Maximum</b>	25

Before testing the hypothesis, several test requirements must be met so that the results can be accounted for. The requirements include normality tests and linearity tests. The results of the prerequisite test of analysis and hypothesis test are presented as follows.

#### 1) Normality Test

The normality test is performed using the Shapiro–Wilk formula with the help of the SPSS program. The rule used to determine whether or not a research data is normal or not is that if the sig > 0.05 (5%) then the data is declared normally distributed. The results of the normality test can be seen in the table below.

**Table 5. Normality Test**

<b>Group</b>	<b>df</b>	<b>Sig.</b>	<b>Conclusion</b>
<b>Balance (X<sub>1</sub>)</b>	20	0,771	Usual
<b>Coordination (X<sub>2</sub>)</b>	20	0,802	Usual
<b>Power Limbs (X<sub>3</sub>)</b>	20	0,736	Usual
<b>Shooting Capability (Y)</b>	20	0,411	Usual

Based on the results of statistical data on shooting ability in futsal games that have been divided by several groups, it was found that the Balance Component group (X<sub>1</sub>) found a Sig. value of 0.771, because the significance value greater than 0.05 means that the data is normally distributed. Furthermore, the coordination component (X<sub>2</sub>) found a Sig. value of 0.802, because the significance value greater than 0.05 means that the data is normally distributed. In the Power component of the leg muscle (X<sub>3</sub>) found a value of Sig. 0.736, because the significance value greater than 0.05 means that the data is normally distributed. And in the shooting capability component (Y) found a value of Sig. 0.441, because the significance value greater than 0.05 means that the data is normally distributed.

#### 2) Linearity Test

The purpose of the linearity test is to find out the relationship between independent and bound variables whether linear or not. Testing using the SPSS application by looking at deviation from linearity at a significance level of 0.05. It is declared to have a linear relationship when the significance value of deviation from linearity is more than 0.05. The results of the linearity test are presented in the following table.

**Table 6. Linearity Test**

<b>Relationship</b>	<b>Sig</b>	<b>P</b>	<b>Information</b>
<b>Relationship X<sub>1</sub> with Y</b>	0,41	0,05	Linear
<b>Relationship X<sub>2</sub> with Y</b>	0,322	0,05	Linear
<b>Relationship X<sub>3</sub> with Y</b>	0,236	0,05	Linear

The results of the linearity test above show the relationship between Balance (X<sub>1</sub>) and Shooting Ability (Y) obtained a sig value of 0.41 > 0.05, meaning that there is a linear relationship between the Balance variable and the Shooting Ability. The relationship between Coordination (X<sub>2</sub>) and Shooting Ability (Y) obtained a sig value of 0.322 > 0.05 means that there is a linear

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relationship between the Coordination variable and Shooting Ability. The relationship between Limb Power (X3) and Shooting Ability (Y) obtained a sig value of  $0.236 > 0.05$  means that there is a linear relationship between the variable Limb Power and Shooting Ability.

### 3) Test the hypothesis

After the data prerequisite test is met, the next step is to test the hypothesis proposed in this study, namely the relationship between Balance (X1), Coordination (X2), and Limb Power (X3), to Shooting Ability (Y). The relationship of each X1 with Y, the relationship of X2 with Y, and the relationship of X3 with Y, using the product moment correlation test from Karl person, while the relationship of X1, X2, and X3, together with Y uses multiple regression analysis with the F test. The results of the correlation test and multiple regression analysis are as follows.

**Table 7. Correlation Analysis**

Variable	r	Sig.	Conclusion
Balance	0,623	0,003	Significant
Coordination	0,472	0,002	Significant
Power Limbs	0,045	0,000	Significant

The relationship between balance and shooting ability first correlation looks for the relationship between balance and shooting ability. The results of the analysis show that the R value is 0.623 with a sig value of  $0.003 < 0.05$ , it can be stated that there is a positive relationship which in the interpretation category is very strong. The second correlation test looks for the relationship between Coordination and Shooting Ability. The results of the analysis show that the R value is 0.472 with a sig value of  $0.002 < 0.05$ , so it can be stated that there is a positive relationship which in the category of interpretation is very strong. The third correlation test looks for the relationship between Leg Power and Shooting Ability. The results of the analysis show that the R value is 0.045 with a sig value of  $0.000 < 0.05$ , so it can be stated that there is a positive relationship which in the interpretation category is quite strong.

The results of hypothesis testing with correlation analysis and multiple regression are presented in the following table.

**Table 8. Multiple Regression Correlation Coefficient**

Variable	r	R <sup>2</sup>	Sig.	Conclusion
Balance (X <sub>1</sub> )	-			
Coordination (X <sub>2</sub> )	-			
Power Limbs (X <sub>3</sub> )	0,809	0,654	0,001	Significant
Shooting Capability (Y)				

From the table above, it is known that the correlation of the entire variable X together with variable Y is 0.809, with the percentage of contribution given by the independent variable to the dependent variable obtained by the R square number of 0.654 or 65.4%. This shows that the percentage of contribution of the influence of the independent variable on the dependent variable contributes significantly to the variability, balance, coordination and power of the leg muscles with the ability to shoot using the instep of 65.4% or the variation of the independent variable used in the model is able to contribute 65.4% while the remaining 34.6% is influenced by other variables that are not included in this research model.

## DISCUSSION

### 1. The Relationship of Balance with Shooting Ability

Balance plays a central role in determining a player's ability to shoot the ball towards goal [35]. Shooting ability in futsal is not only about strength and technique, but also requires optimal stability of the player's body [36]. Balance is an aspect that includes coordination, stability, and control of overall body movements [37]. In the context of futsal shooting ability, balance affects various technical and tactical aspects. Good balance allows players to maintain the right body position when shooting, both from a stationary position and in movement. Without enough balance, players tend to lose precision and power in their shots. Poor balance can also result in players being unstable when trying to shoot, which in turn can cause good opportunities to go to waste. A good balance also allows players to quickly adapt to changing situations on the field. In futsal, situations often change

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quickly and players need to be able to adjust to those changes. Strong balance helps players to stay focused and control their movements efficiently, so they can quickly adjust body position and shoot accurately even in stressful situations [38].

The importance of balance in futsal shooting ability is also evident in the strategy of the game. Teams that have players with good balance tend to be more effective in attacking and scoring. With a strong balance, players can be more flexible in their movements on the field, thus creating better and more frequent shot opportunities [39]. Balance has a very close relationship with shooting ability in futsal. Good balance affects various technical and tactical aspects of shooting ability, including precision, power, and the ability to adapt to changing game situations [40]. It is important for futsal players to consistently train and develop their balance through proper physical and mental training [41]. By understanding the importance of balance in their performance, players can improve their shooting ability and make a greater contribution to their team in futsal matches.

### **2. Coordination Relationship with Shooting Capability**

Coordination is an important aspect in the game of futsal that has a close relationship with shooting ability [42]. In futsal, coordination refers to the ability to regulate body movements efficiently and well coordinated to achieve certain goals, such as controlling the ball, moving on the field, and executing kicks or shooting appropriately [43]. Good coordination skills allow futsal players to carry out various tasks effectively and efficiently, including in the context of shooting or releasing kicks towards the opponent's goal [44].

One important aspect of coordination in conjunction with shooting futsal is the ability to control and direct the ball precisely before kicking. In fast-paced and intense game situations such as futsal, players often have to react quickly to opponents' movements and ball positions to prepare themselves for shooting. Good coordination ability allows players to quickly adjust the position of their body and feet to get the optimal kick angle, thereby increasing the chances of scoring [45].

In addition, coordination also affects the ability of futsal players to maintain balance and body stability when shooting. In situations where players may encounter pressure from opposing players or have to shoot from unstable positions, the ability to maintain body coordination becomes key. Players who have good coordination will be better able to stay balanced and maintain control of their shots, even in challenging situations.

In addition to general body coordination, eye-hand coordination also has a significant role in futsal shooting ability. When making a kick, players must be able to coordinate movement between their eyes to identify the target (i.e. goal) and their hands or feet to direct the ball in the desired direction. Good eye-hand coordination allows players to precisely direct their shots to desired angles with great precision, increasing the chances of scoring. Coordination has a strong relationship with futsal shooting ability [46]. The ability to control body movements efficiently and in a coordinated manner allows players to execute shots with precision and precision. In addition, coordination also affects the player's ability to maintain balance and body stability, choose the right shooting technique, and work together with teammates to create good shooting opportunities [47]. Therefore, the development of coordination is very important in training futsal shooting skills both individually and in teams.

### **3. The Relationship of Limb Power with Shooting Ability**

Leg power, or strength in the legs, is one of the important factors in determining the ability of a futsal player to shoot [48]. Shooting ability in futsal covers various aspects, such as accuracy, speed, and kick power [49]. Limb power has a close relationship with futsal shooting ability because it plays a role in generating the power and speed needed to release accurate and lethal kicks [4].

Leg strength affects the kick strength of a futsal player. When a player has strong limb power, he can generate more power when kicking the ball. Along with that, the resulting kicks also tend to be harder and difficult to be denied by the opposing goalkeeper. This is important in those situations where the player has to release the kick from a distance or in pressure situations, where a strong kick force can make the difference between scoring a goal or not.

The strength of the limbs also affects the speed of the ball when released by the player. The stronger the power of a player's limbs, the faster the ball can pass towards the opponent's goal. This ball speed can make it difficult for opposing goalkeepers to anticipate the direction and strength of the kick, thereby increasing the player's chances of scoring. In counterattack or counter situations, the kick speed generated by strong limb power can be a powerful weapon for the team to take advantage of gaps in the opponent's defense. Strength in the limb power also contributes to stability and balance when the player kicks the ball [5]. Players with strong limb power tend to have better control over their kicks, allowing them to maintain accuracy even in difficult situations. This is especially important in futsal, where space for movement is often limited and any mistakes can be exploited by opponents.

In addition to having a direct impact on shooting ability, strength in the power of the limbs also plays a role in increasing the endurance and physical endurance of players [6]. Exercises to develop leg power involve the use of a variety of movements, including sprints, jumps, and other movements that require leg muscle strength. With increased physical strength and endurance, players will be able to maintain their best performance throughout the match, including in crucial moments where shooting ability



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is needed. Limb power has a significant relationship with shooting ability in futsal. Limb strength affects a player's strength, speed, stability, and physical endurance, all of which are important factors in creating accurate and lethal kicks [7]. However, to become an effective futsal player, it also requires the development of other aspects such as technique and tactical understanding. Thus, players can achieve their best performance in scoring goals and contribute to their team to the maximum.

### IV. CONCLUSION

Based on the results of data analysis, description, testing of research results, and discussion, it can be concluded that there is a significant relationship between balance and the results of the shooting ability of futsal players which in these results obtained an R value of 0.623 with a sig value. amounted to 0.003. There is a significant relationship between coordination and the results of the shooting ability of futsal players which in these results obtained an R value of 0.472 with a sig value. amounted to 0.002. There is a significant relationship between leg power and the results of the shooting ability of futsal players which in these results obtained an R value of 0.045 with a sig value. of 0.000. And there is a significant relationship between coordination, balance, and leg muscle power with the ability to shoot using the instep in futsal sports where the results obtained an R<sup>2</sup> value of 0.654 with a sig value. amounted to 0.001. Having maximum shooting results requires several important components such as balance, coordination and leg power. Then another implication is that from the results of research power limbs have a very influential role. So that it provides recommendations to coaches to maximize shooting results can provide training to increase the power of the limbs in athletes.

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