

Contribution of Leg Muscle Explosive Power: Improving Basic Passing Skills in Futsal Athletes

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Abstract

Improving athlete performance is an integral part of a coach's skill set. Each technique has a different biomotor effect, one of which is optimizing basic passing techniques in futsal. This study aims to determine the contribution of leg muscle strength and passing skills in futsal. The population in this study consisted of 20 athletes, and the sampling method used in this study was total sampling. Thus, the sample in this study consisted of 20 athletes. The data collection instruments in this study used tests and measurements, namely passing skills and leg muscle strength. The research data analysis was tested using normality tests, linearity tests, and Pearson's correlation. The results of this study indicate that there is a significant relationship ($p < 0.05$) between muscle strength and passing skills, with a correlation coefficient of 0.751 indicating a strong correlation. This shows that leg muscle strength has a significant contribution to passing skills in futsal. The implications of this study lie in the contribution of leg muscle explosive power to basic passing skills in futsal, which is very important both theoretically and practically. Theoretically, this study reinforces the concept that physical ability, particularly leg muscle explosive power, is one of the dominant factors that influence the successful execution of basic techniques in futsal. These findings support coaching and motor learning theories which state that technical quality is greatly influenced by the physical condition of athletes.

Keywords: *Contribution, Strength, Leg Muscle Power, Passing, Futsal.*

Introduction

Futsal is an indoor soccer game played five against five on a smaller field. Futsal is a rapidly growing sport that is popular among various groups, especially students. Futsal is played by two teams, each consisting of five players, on a relatively small field with a fast tempo and high intensity. The characteristics of the game require players to have good basic technical skills, quick decision-making, and excellent physical condition in order to maintain their performance throughout the match (Kustiawan et al., 2025). Futsal players must be proficient in the basic techniques of futsal, such as receiving (control), chipping, dribbling, shooting, heading, catching, and passing. Passing is an important technique that futsal players must have. This is important because passing greatly affects the game of futsal. To start an attack and work together in playing the ball, players must have good basic passing techniques so that attacks and teamwork can run smoothly and the opponent cannot stop them (Nia et al., 2025). A futsal player must have leg muscle strength, defined as the ability of the lower extremity muscles to generate maximum force when performing a movement. In futsal, leg muscle strength is needed to generate optimal leg thrust when passing the ball, maintaining body balance, and controlling the direction and speed of the ball accurately.

Futsal is one of the rapidly growing sports that is popular among various groups, especially students. Futsal is played at a fast pace, in a relatively narrow playing area, and requires players to be able to make quick and accurate decisions (Kustiawan et al., 2025). Therefore, mastery of basic techniques is an important factor in supporting the performance of futsal players during matches (Adha et al., 2023). One of the most dominant basic techniques in futsal is passing. Passing serves as the main means of building teamwork, maintaining ball possession, and creating scoring opportunities.

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Good passing quality is characterized by speed, accuracy, and strength of the pass that is appropriate to the game situation. If a player has poor passing skills, the team's flow of play will be disrupted and it will be difficult to implement the planned strategy optimally.

Success in passing is not only determined by technical mastery, but also influenced by the physical condition of the player (Bartík & Pacholek, 2024). One component of physical condition that plays an important role in passing is leg muscle explosive power (Asmara et al., 2023). Leg muscle power is the ability of muscles to exert maximum force in a short period of time (Sado et al., 2020). In the context of futsal, leg muscle explosive power is needed to generate strong and fast leg thrust when passing, both short passes and medium-range passes (Fu et al., 2026). In reality, there are still many futsal players, especially at the student or beginner level, who have difficulty passing well. Students of the Physical Education, Health, and Recreation Study Program at Sebelas Maret University are prospective educators and sports practitioners who are required to have a comprehensive understanding of the relationship between physical condition and sports technical skills. Therefore, this study is important to provide empirical evidence regarding the contribution of leg muscle strength to basic passing technical skills in futsal among students. Common mistakes include passes that are not strong enough, inaccurate, or easily intercepted by opponents. This is thought to be caused not only by a lack of technical mastery, but also by suboptimal physical condition, particularly low leg muscle power. Lack of attention to physical conditioning training is often the reason why basic technical skills do not develop to their full potential.

Futsal training generally still emphasizes mastery of technique and game strategy, while physical conditioning, especially leg muscle power, has not received a balanced amount of training (Bartol et al., 2022). In fact, good physical condition will support the effective and efficient execution of techniques (Richardson et al., 2024). Without adequate leg muscle explosive power, a player will find it difficult to make good quality passes even if they understand the basic techniques (Fitrian et al., 2023). Based on this description, it can be understood that there is a correlation between leg muscle explosive power and basic passing skills in futsal. However, the extent to which leg muscle explosive power contributes to passing skills still needs to be scientifically proven through research. This research is important to provide a clear picture of the role of leg muscle explosive power in supporting passing skills, so that it can be used as a basis for planning more effective futsal training programs.

The urgency of this research lies in the need for a strong scientific basis regarding the role of leg muscle explosive power in supporting basic futsal passing skills. Until now, futsal training programs have tended to focus more on technical and tactical training, while physical conditioning training has often not been specifically designed and measured according to basic technical needs. Without a clear understanding of the contribution of leg muscle explosive power to passing, coaches and physical education teachers may develop training programs that are ineffective and not integrated. In addition, there has been little research specifically examining the relationship between leg muscle explosive power and passing skills in futsal, especially in the context of youth development. Therefore, this study is important to provide empirical evidence on the extent to which leg muscle explosive power contributes to passing skills, so that it can be used as a reference in developing more targeted futsal training and learning methods. The implications of this study are expected to provide practical benefits for the world of sports, especially futsal. For coaches and trainers, the results of this study can be used as a basis for developing training programs that integrate passing technique training with increased leg muscle explosive power. For physical education teachers, this study can be a reference in designing futsal lessons that balance physical conditioning and technical skill development. Meanwhile, for futsal athletes, understanding the importance of leg muscle explosive power is expected to increase motivation to train physical aspects as part of efforts to improve game performance.

Method

The type of research used was quantitative research with a correlational research design. Correlational research can be used to test hypotheses about how variables interact with each other or to determine how strong the relationship is between two or more variables. The sampling technique used in this study was total sampling. A sample of 20 athletes was taken. The instrument used in this study was a test, with the intention of the researcher conducting a practical test directly to the respondents regarding leg muscle strength and passing skills. Data collection in this study used a passing skill measurement test and a leg muscle strength measurement test using a squat jump test.

The data collection technique was carried out by preparing the place and tools used for the practical test. Next, the respondents were divided into two groups and given an explanation of the test

to be carried out. Then, the students took the test alternately and sequentially, and the data was recorded systematically. To measure the extent to which leg muscle strength contributes to passing skills, normality tests, linearity tests, and correlation tests were conducted using the SPSS application.

Result and Discussion

Result

This study was conducted to determine the extent to which leg muscle strength contributes to passing skills in futsal and to identify the relationship between these two variables. Based on the study, the overall data results are summarized and presented in the following table.

Table 1. Summary of Research Data Results

| Variable | Instrument | Minimum | Maximum | Mean | Std. Deviation |
|---------------------|---------------------|---------|---------|-------|----------------|
| Leg Muscle Strength | Leg Muscle Strength | 12 | 20 | 16.00 | 2.00 |
| Passing Skills | Passing | 6 | 16 | 11.00 | 2.50 |

Based on the results of the table above, it can be concluded that for the leg muscle strength variable, using the leg muscle strength test instrument, the minimum result was 12, the maximum was 20, and the average value was 16.00 with a standard deviation of 2.00. Furthermore, for the passing skill variable using the passing test instrument, the minimum result was 6, the maximum was 16, and the average value was 11.00 with a standard deviation of 2.50.

After obtaining the research data, a prerequisite test was conducted. The results are shown in the table below.

1. Normality Test

The normality test was conducted to determine whether the residual values of both variables were normally distributed. The following are the results of the normality test using Kolmogorov-Smirnov..

Table 2. Normality Test

| Variable | N | Sig | Criteria |
|---------------------|----|-------|----------|
| Leg Muscle Strength | 20 | 0.168 | Normal |
| Passing Skills | 20 | 0.116 | Normal |

Based on the results of the normality test above, it is concluded that the lower limb muscle strength has a value of 0.168, which is greater than 0.05 ($0.168 > 0.05$), meaning the variable is normally distributed, and passing skills have a significance value of $0.116 > 0.05$, which also means they are normally distributed.

2. Linearity Test

Linearity testing is a procedure to determine whether the distribution of research data is linear or not. Linearity testing seeks the regression line equation of the independent variable against the dependent variable. The results of simple regression analysis are used to determine the strength of the linear relationship between the independent and dependent variables.

Table 2. Linearity Test

| Variable | F | Sig | Criteria |
|--------------------------------------|-------|-------|----------|
| Passing Skills – Leg Muscle Strength | 0.245 | 0.978 | Linear |

Based on the results of the linearity test above, it can be concluded that the variable has an Fcount (Deviation from Linearity) value of 0.245 with a significance value of 0.978. This result indicates that the

significance value of $0.978 > 0.05$, which means that there is a linear relationship between the independent variable (passing skills) and the dependent variable (leg muscle strength).

3. Hypothesis Testing

Hypothesis testing uses the bivariate product moment correlation test to determine the strength of the relationship between leg muscle strength and passing skills.

Table 3. Pearson's Bivariate Product Moment Correlation Test

| Variable | N | Correlation Coefficient | Sig. | Criteria |
|---|----|-------------------------|-------|----------------------------|
| The contribution of leg muscle strength to passing skills in futsal | 20 | 0,751 | 0,003 | Berkorelasi dan signifikan |

Based on the results of the correlation test above, it is known that both variables have a significance value of $0.003 < 0.05$ and a correlation coefficient of 0.751. Based on the degree of relationship guidelines, it can be concluded that the independent variable (leg muscle strength) and the dependent variable (passing skills in futsal) have a significant relationship.

Discussion

Based on the results of the research data analysis, a significance value of 0.003 was obtained, which is smaller than the significance level of 0.05. These results indicate that there is a significant relationship between leg muscle explosive power and basic passing skills in futsal. Thus, the hypothesis stating that leg muscle explosive power contributes to passing skills can be accepted. In addition, the correlation analysis results show a correlation coefficient value of 0.751. This value falls into the category of a strong and positive relationship, which means that the higher the leg muscle explosive power possessed by the player, the better the basic passing skills displayed. Conversely, players with low leg muscle explosive power tend to have less than optimal passing skills. These findings indicate that leg muscle explosive power is one of the important factors that influence passing quality in futsal.

Biomechanically, leg muscle explosive power plays a major role in generating strength and speed of foot movement when passing (Munir & Prayoga, 2021). Passing in futsal requires fast and accurate movements, both in open play and under pressure from opponents (Bouafif et al., 2024). Good leg muscle explosive power allows players to provide a strong leg thrust in a short time, so that the ball can travel at a speed and direction that matches the target (Ramari et al., 2020). This is in line with research conducted by Hirata et al. (2024), which states that effective passing minimizes errors such as the ball being easily intercepted by opponents.

The results of this study are also in line with the concept of sports training researched by (Chen et al., 2024), which states that technical skills cannot be separated from physical condition. Although mastery of passing techniques is a major factor, without adequate leg muscle power, the execution of these techniques will not be optimal (Pan et al., 2025). In other words, physical condition serves as the foundation for the execution of basic futsal techniques (Ma et al., 2017). This finding is reinforced by (Ferri-caruana et al., 2025)'s view that improving technical skills must be accompanied by an improvement in the relevant physical condition components. In the context of futsal coaching, the results of this study indicate that lower limb explosive power training plays an important role in improving players' passing skills. Training programs that only focus on passing technique repetition without paying attention to the development of leg muscle explosive power have the potential to produce less than optimal improvements (Ji et al., 2025). Therefore, coaches are advised to combine technical training with physical training, such as plyometric training, explosive strength training, and coordination training involving the leg muscles.

In addition, the strong relationship between leg muscle explosive power and passing skills also shows that leg muscle explosive power can be used as an indicator in evaluating futsal players' abilities (Vasquez-bonilla et al., 2025). Players with good leg muscle explosive power tend to be better able to adapt to the fast and dynamic tempo of futsal (Schieber et al., 2016). This is important in the athlete selection process and in monitoring training progress on a regular basis. Although this study shows a significant and strong relationship, the results do not mean that leg muscle explosive power is the only factor that affects passing skills (Iorio et al., 2025). Other factors such as coordination, balance, spatial

perception, playing experience, and psychological aspects also play a role (Heydari et al., 2025). Therefore, improving passing skills needs to be done comprehensively by considering various aspects that support the performance of futsal players (Stagsted et al., 2021).

Overall, the results of this study prove that leg muscle explosive power has a significant contribution to basic passing skills in futsal. These findings imply that physical conditioning, especially leg muscle explosive power, needs to be an integral part of futsal training and learning programs. With planned and integrated training, it is hoped that futsal players' passing skills can be optimally and sustainably improved. Practically, this study has implications for coaches, physical education teachers, and futsal athletes in designing training programs. Leg muscle explosive power has been proven to contribute to passing quality, so physical training should not only focus on technical aspects but also be integrated with physical conditioning exercises, especially those aimed at increasing explosive power, such as plyometrics, squat jumps, and other explosive strength exercises. With improved lower limb muscle power, athletes are expected to be able to pass the ball with greater strength, speed, and accuracy in accordance with the dynamic demands of futsal.

Conclusion

Based on the results of research and discussion regarding the contribution of leg muscle power to basic passing skills in futsal, it can be concluded that there is a significant relationship between the two variables. This is evidenced by a significance value of 0.003, which is smaller than the significance level of 0.05, thus indicating that leg muscle explosive power has a significant effect on the passing skills of futsal players. Therefore, leg muscle explosive power can be considered one of the physical condition components that has an important contribution in supporting basic passing skills. The results of this study confirm that improving passing skills does not only depend on technical mastery but must also be supported by good physical condition, especially leg muscle explosive power. Overall, this study provides an understanding that the development of leg muscle explosive power needs attention in futsal training and learning programs. With planned and integrated training between technical and physical aspects, it is hoped that the passing ability of futsal players can be optimally and sustainably improved.

Acknowledgements

The researchers would like to thank all parties involved. Thanks to their assistance, this research was successfully completed. Hopefully, this research will benefit all levels of society, especially coaches and teachers, in optimizing leg muscle power in futsal.

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