



Correlation Between Leg Muscle Explosive Power and Shooting Futsal Ability

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Abstract

This study aims to determine the relationship between the explosiveness of the leg muscles and the ability to shoot futsal in students participating in futsal extra-curricular at SMP Muhammadiyah 3 Semarang. The research uses a quantitative approach with a correlational descriptive design. The research population amounted to 40 male students who actively participated in futsal extracurriculars with sampling techniques using total sampling. The data collection instruments included a vertical jump test to measure the explosiveness of leg muscles and a shooting test to measure futsal shooting ability. The data analysis technique used descriptive statistics, Shapiro-Wilk normality test, Pearson Product Moment correlation test, and determination coefficient analysis. The results of the study showed a significance value of $0.000 < 0.05$ which means that there is a positive and significant relationship between the explosive power of the leg muscles and the ability to shoot futsal. The value of the correlation coefficient of 0.539 is included in the category of medium relationships. In addition, the determination coefficient value showed that the explosive power of the leg muscles contributed 29.1% to shooting ability. The study's findings show that students who have better leg muscle explosiveness tend to have stronger and more accurate shooting. Therefore, coaches are advised to implement a training program that focuses on increasing the explosiveness of the leg muscles to improve students' futsal shooting skills.

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INTRODUCTION

Futsal is a game sport that requires mastery of techniques, tactics, and good physical condition in a relatively narrow playing space. In the modern futsal game, shooting ability is one of the basic techniques that is very important because the success of scoring goals determines the outcome of the match. (Jefri et al., 2022) Explained that shooting is a decisive technique in creating opportunities and producing goals in the game of futsal. Therefore, players are required to have good technical skills and physical condition to support playing performance. (Mahyuddin & Siregar, 2024) stating that good physical condition greatly affects the effectiveness of futsal players' technical skills during the match.

One of the components of physical condition that greatly affects the ability to shoot is the explosive power of the leg muscles (Adhi, 2021). Explosive power is the ability of muscles to produce maximum power in a very short time. In the game of futsal, explosiveness is needed when players sprint, change of direction, jump, and especially when shooting with high power and accuracy. Players who have good leg muscle explosiveness tend to be able to produce stronger kicks so that the ball moves faster and is difficult for the goalkeeper to anticipate.

The explosiveness of the leg muscles has an important role in supporting strong and accurate shooting techniques in the game of futsal. (Iqbal, 2020) Explains that leg muscle power contributes to the accuracy of the target in futsal playing skills. The statement is supported by (Ardiansyah, 2020) which states that the strength and explosiveness of the leg muscles affect the quality of foot contact with the ball as well as the shooting accuracy. (Parmadi et al., 2022) He also explained that the explosive power of the leg muscles has a significant relationship with the ability to shoot futsal. Biomechanically, shooting movements involve coordinated contractions of the quadriceps, hamstrings, gastrocnemius, and gluteus muscles. In addition, (Hung et al., 2021) states that strength and balance training has a significant influence on shooting performance in sports activities.

Based on the results of observations on futsal extracurricular activities at SMP Muhammadiyah 3 Semarang, some students still showed less than optimal shooting skills. The shots that are carried out are often not on target and do not have enough power so that the ball is easily anticipated by the goalkeeper. In addition, some students look less confident when shooting directly at the goal in game situations.

Extracurricular training programs have so far focused more on games and tactical exercises than specific physical condition training. (Indra et al., 2024) Explained that a structured physical training program has an important influence on improving the technical performance of school-age futsal players. In fact, (Rahmayanti et al., 2024) stated that the explosive power training of the leg muscles is very important to improve the ability of futsal shooting. (Yunita et al., 2022) He also explained that plyometric training is able to increase the explosiveness of the leg muscles and the shooting ability of futsal players. Therefore, the development of physical condition, especially the explosive power of leg muscles, needs attention in students' futsal training programs.

Several previous studies have discussed the importance of explosiveness in football and futsal performance. (Muh. Fajri et al., 2024) found a significant relationship between leg muscle power and futsal shooting ability in high school students. (Rahmayanti et al., 2024) It is also reported that explosive training programs have a positive influence on improving the shooting accuracy of futsal athletes. In addition, (Burhaein et al., 2020) explained that explosiveness, balance, and coordination are important factors that determine the success of shooting in young football athletes.

Despite this, most previous research has been conducted on soccer athletes or high school students, while research focusing on junior high school students in the context of futsal extracurricular activities is still limited. In addition, previous research focused more on the aspects of exercise and performance improvement, while studies on the relationship between leg muscle explosiveness and shooting ability in early adolescence still require reinforcement of empirical data. Therefore, this research has novelty in the research subject that uses junior high school students participating in futsal extracurricular activities as research objects.

In the game of futsal, shooting techniques are not only carried out in organized attack situations, but also in game transitions that take place very quickly (Kurniawan & Iqbal, 2021).

Players are required to be able to make decisions quickly and shoot accurately under the pressure of the opponent. Therefore, the readiness of physical condition, especially the explosive power of the leg muscles, is an important factor in supporting the effectiveness of shooting during the match.

This study was conducted to provide empirical evidence regarding the relationship between the explosiveness of leg muscles and the ability to shoot futsal in futsal extracurricular students of SMP Muhammadiyah 3 Semarang. The results of the research are expected to be useful information for coaches, teachers, and students in compiling effective training programs to improve futsal performance.

METHODS

This study uses a quantitative approach with a correlational descriptive research design. The correlational method was chosen because the researcher wanted to know the relationship between the free variable and the bound variable without manipulating the research condition. According to (Iqbal, 2020), correlational research is used to determine the relationship between variables through statistical analysis based on numerical data.

The free variable in this study was the explosive power of the leg muscles, while the bound variable was the ability to shoot futsal. The research was carried out at SMP Muhammadiyah 3 Semarang during the futsal extracurricular training activities.

The research population consisted of all male students who actively participated in futsal extracurricular activities at SMP Muhammadiyah 3 Semarang with a total of 40 students. Because the population is relatively small and can be reached completely, the sampling technique used is total sampling, where all members of the population are used as research samples.

The instrument used to measure the explosive power of the leg muscles is the vertical jump test. This test is widely used in sports science because it effectively measures the explosive ability of leg muscles (Dan et al., 2021). The test procedure is carried out by measuring the difference between the height of the standing achievement and the maximum jump achievement. Each participant underwent three attempts and the highest score was recorded as the final result.

The shooting test instrument uses a test shooting to a modified target with the target in the goal area. Each participant made five kicks from a distance of six meters. The assessment is carried out based on the accuracy of the ball regarding the predetermined target. The more accurate the target of the kick made, the higher the score the student gets. The use of this instrument aims to objectively measure shooting ability based on the accuracy of the kick.

The shooting ability test was carried out by asking participants to make five kicks towards the target from a distance of six meters. Each kick that enters the target area is scored based on the level of accuracy. The total score obtained becomes the value of the student's shooting ability. Before data collection was carried out, all participants warmed up for 15 minutes in the form of stretching and light jogging to reduce the risk of injury. The equipment used in the study included futsal balls, cones, meters, whistles, goal targets, scoring sheets, and stationery.

The data analysis technique used descriptive statistics, normality tests, and hypothesis tests. The normality test used Shapiro-Wilk because the sample count was less than 50 people. After the data was declared normal, the analysis was continued using the Pearson Product Moment correlation test to determine the relationship between the explosiveness of the leg muscles and the ability to shoot futsal. In addition, a determination coefficient analysis was carried out to determine the amount of contribution of the explosive power of the leg muscles to shooting ability.

With these research procedures and data analysis techniques, it is hoped that the results of the study can provide an objective picture of the relationship between the explosive power of the leg muscles and the ability to shoot futsal in futsal extracurricular students of SMP Muhammadiyah 3 Semarang.

RESULTS AND DISCUSSION

The research data was obtained from 40 male students participating in the futsal extracurricular of SMP Muhammadiyah 3 Semarang. The variables measured in this study included the explosive power of leg muscles and the ability to shoot futsal.

Descriptive statistical analysis was carried out to provide an overview of the research data which included the mean value, standard deviation, minimum value, and maximum value of each research variable. The results of descriptive statistics on the explosiveness of leg muscles and futsal shooting ability can be seen in the following table.

Table 1. Descriptive Statistics

	Means	SD	Min	Max
Leg Muscle Explosive Power	48,75	6,42	36	61
Shooting	21,40	4,11	14	29

Based on **Table 1**, descriptive statistics obtained an average leg muscle explosiveness of 48.75 with a standard deviation of 6.42. The minimum score obtained by students is 36 and the maximum score is 61. Meanwhile, futsal shooting ability has an average of 21.40 with a standard deviation of 4.11, a minimum score of 14, and a maximum score of 29. These results show that the explosive ability of leg muscles and futsal shooting is in a fairly varied category.

Before the hypothesis test was carried out, a prerequisite test was first carried out in the form of a normality test using the Shapiro-Wilk method.

Table 2. Normality Test

	Statistic	df	Sig	Description
Leg Muscle Explosive Power	0,948	40	0,065	Normal
Shooting	0,975	40	0,524	Normal

Based on **Table 2**, the significance value of the limb muscle explosive variable was 0.065 while the shooting variable was 0.524. Since both values are greater than 0.05, it can be concluded that the data of the two variables are normally distributed so that they are eligible for the *Pearson Product Moment correlation test*.

Table 3. Correlation Test

	Correlation Coefficients	Coefficient of Determination	Sig (2-tailed)
X to Y	0,539	0,291	0,000

The results showed a correlation coefficient value of 0.539 which was included in the category of medium relationships. The significance value of 0.000 is smaller than 0.05 which means that there is a positive and significant relationship between the explosive power of the leg muscles and the ability to shoot futsal. The determination coefficient value of 0.291 showed that the explosiveness of the leg muscles contributed 29.1% to students' shooting ability, while the remaining 70.9% was influenced by other factors that were not studied such as coordination, flexibility, balance, concentration, technical skills, and training experience. (Imka & Jatra, 2025) explained that eye-foot coordination also has an important contribution to the accuracy of futsal shooting.

The results of the study showed that students who had better leg muscle explosiveness tended to have better shooting skills as well. Biomechanically, explosive power contributes to the magnitude of the force generated when making a kick. When a player shoots, the leg muscles contract quickly to produce maximum acceleration thus increasing the speed of the ball and the effectiveness of the kick. The results of this study are in line with the research (Muh. Fajri et al., 2024) which found a positive relationship between leg muscle power and futsal shooting ability. (Adhi, 2021) It also explains that explosive power training contributes significantly to the increase in shooting power and accuracy. Physiologically, the ability to generate power in a short period of time allows players to generate greater limb swing speed

when shooting. This condition causes the thrust to the ball to increase resulting in a stronger and faster kick.

In addition to muscle strength factors, neuromuscular coordination also affects the quality of shooting. Players who have good coordination of movements are able to control their balance when making support and contact with the ball so that the direction of the kick becomes more accurate. (Wulandari et al., 2026) explained that eye-foot coordination is closely related to the shooting accuracy of futsal players. Therefore, shooting ability is not only influenced by the explosiveness of the leg muscles, but also influenced by the player's technical skills and movement coordination.

However, the medium relationship category in this study suggests that explosiveness is not the only factor that affects shooting ability. Mastery of technique remains an important factor in successful shooting. Players who have high explosive power but poor shooting technique can still produce inaccurate kicks. In addition, coordination, balance, concentration, confidence, and playing experience also affect the effectiveness of shooting. (Haddad et al., 2023) explained that neuromuscular performance and body balance have a relationship with the quality of athletes' movements in sports games.

The relationship between the medium category can also be influenced by the characteristics of junior high school students who are still in the stage of physical development and motor coordination. The level of playing experience and the intensity of training between students are also different, which can affect shooting performance when taking data.

The results of this study provide practical implications for physical education trainers and teachers. (Anggraini et al., 2023) stated that physical condition training carried out regularly is able to improve the performance of basic techniques of adolescent futsal players. Trainers are advised to incorporate plyometric exercises such as squat jumps, box jumps, lunges, and hurdle jumps into the exercise program to increase the explosiveness of the leg muscles. Hurdle jump and lunges exercises are effective in increasing the explosiveness of the leg muscles of futsal players. In addition, repeated shooting exercises need to be done regularly to improve the accuracy and consistency of students' shooting.

This study has a limited number of samples and is only conducted in one school so that the results of the study cannot be generalized widely. (Sarifudin et al., 2023) explained that psychological factors such as concentration and confidence can also affect the shooting ability of futsal players. In addition, this study only examined the relationship between leg muscle explosiveness and shooting ability without examining other factors such as coordination, agility, balance, and playing experience that can also affect futsal shooting ability. Therefore, researchers are then advised to use a larger sample number and add other variables to make the results of the study more comprehensive.

CONCLUSION

Based on the results of the study, it can be concluded that there is a positive and significant relationship between the explosiveness of the leg muscles and the ability to shoot futsal in students participating in the futsal extracurricular of SMP Muhammadiyah 3 Semarang. The correlation coefficient value of 0.539 indicates a moderate level of relationship, while the determination coefficient value of 29.1% indicates that the explosive power of the leg muscles contributes significantly to futsal shooting ability.

The research findings show that students who have better leg muscle explosiveness tend to produce stronger and more accurate shooting. Therefore, increasing the explosive power of leg muscles through structured physical exercises is essential to improve futsal shooting skills.

Physical education coaches and teachers are advised to develop a balanced exercise program between physical conditioning training and shooting technique training. Researchers are also advised to research other variables that affect shooting ability such as coordination, balance, agility, concentration, and flexibility.

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