

# The Contribution of Leg Muscle Speed and Strength to Football Dribbling Performance

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## Abstrak

Penelitian ini dilakukan karena rendahnya tingkat keterampilan menggiring bola pada siswa yang mengikuti program ekstrakurikuler sepak bola di MTs Raden Intan Gading Rejo, Lampung, serta masih terbatasnya pemahaman mengenai pengaruh faktor fisik seperti kecepatan dan kekuatan otot tungkai terhadap performa menggiring bola. Tujuan penelitian ini adalah untuk mengkaji kontribusi kecepatan dan kekuatan otot tungkai terhadap keterampilan menggiring bola siswa. Penelitian ini menggunakan desain penelitian korelasional. Populasi penelitian terdiri dari 22 siswa yang mengikuti program ekstrakurikuler sepak bola, dan teknik pengambilan sampel menggunakan total sampling sehingga jumlah sampel sebanyak 22 siswa. Pengumpulan data dilakukan melalui tes lari 40 yard (36,6 meter) untuk mengukur kecepatan, tes kekuatan otot tungkai menggunakan leg dynamometer, serta tes keterampilan menggiring bola. Data dianalisis menggunakan korelasi product moment, dan signifikansi diuji dengan uji t. Hasil penelitian menunjukkan bahwa kecepatan memberikan kontribusi sebesar 53,2% terhadap kemampuan menggiring bola, kekuatan otot tungkai sebesar 26,1%, dan secara bersama-sama kecepatan serta kekuatan otot tungkai memberikan kontribusi sebesar 53,9% terhadap keterampilan menggiring bola.

**Kata kunci:** Pendidikan jasmani, Pengembangan keterampilan motori, Kegiatan ekstrakurikuler, Prestasi siswa / Kinerja siswa, Kebugaran jasmani.

## Abstract

This study was conducted due to the low level of dribbling ability among students participating in the soccer extracurricular program at MTs Raden Intan Gading Rejo, Lampung, as well as the limited understanding of how physical factors such as speed and leg muscle strength influence dribbling performance. The objective of this research was to examine the contribution of leg muscle speed and strength to students' dribbling skills. A correlational research design was applied. The population consisted of 22 students involved in the soccer extracurricular program, and total sampling was used, resulting in 22 participants. Data were collected using a 40-yard (36.6-meter) sprint test to measure speed, a leg dynamometer to assess leg muscle strength, and a soccer dribbling test to evaluate dribbling skills. The data were analyzed using product-moment correlation, and significance was tested with a t-test. The findings indicated that speed contributed 53.2% to dribbling ability, leg muscle strength contributed 26.1%, and the combined contribution of speed and leg muscle strength to dribbling skills was 53.9%.

**Keywords:** Physical education, motor skills development, extracurricular activities, student performance, physical fitness.

## 1. INTRODUCTION

Dribbling is a fundamental skill that every soccer player must possess and continuously develop, as it directly impacts game performance. This technique involves carrying the ball using the feet to penetrate the opponent's defense, evade defenders, and create goal-scoring opportunities (Hughes in Aswito, 2013; Sabila Nur F et al., 2021). The effectiveness of dribbling depends not only on technical mastery but also on physical attributes, such as speed, agility, and leg muscle strength, which are closely linked to overall match performance (Sarmiento et al., 2018). Maintaining close ball control during dribbling allows players to maneuver effectively and respond quickly to changing game situations,

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demonstrating the integration of technical skill and physical conditioning. Regular training, repeated drills, and specific strength exercises are necessary to develop fast, agile dribbling skills and robust lower-limb musculature, which can be displayed during competitive matches (Zabaloy et al., 2021; Durkalec-Mąkowiak et al., 2019; Harper et al., 2021).

Speed is a critical component in executing successful dribbling maneuvers. It enables players to move quickly between points, accelerate after receiving a stimulus, and perform consecutive technical actions in rapid succession (Syafudin, 2011; Ismaryanti, 2006; Rusli in Purba, 2017; Brown in Purba, 2017; Gunawan, 2016; Mylsidayu, 2015; Noor Akhmad et al., 2018). The development of maximum speed is closely dependent on muscular strength, as strength generates the force required to accelerate body movements effectively. The central nervous system and muscle apparatus interact to produce rapid movements, making speed both a physiological and neuromuscular attribute. In soccer, speed contributes to quick dribbling, fast changes of direction, and timely responses to opponents' actions.

Leg muscle strength, especially in the lower limbs, is equally essential for dribbling performance. Strength allows players to withstand external loads, generate explosive force, and maintain control over the ball during high-intensity movements (Naser et al., 2022; Bompa & Buzzichelli, 2019). The hip adductors, which move the upper leg toward the midline of the body, are particularly important in soccer. These muscles are activated during ball dribbling, contributing to stability, balance, and directional control while navigating around defenders (Jaenada-Carrilero et al., 2024; Moreno-Pérez et al., 2022). Lower limb strength also supports sprinting, change-of-direction speed, and repeated high-intensity actions, all of which underpin effective dribbling and technical execution (Souza et al., 2017; Christensen & Bangsbo, 2019).

Evidence indicates that youth and elite soccer players with greater leg strength and neuromuscular coordination display superior dribbling performance, faster acceleration, and improved ball control (Muyor et al., 2017; Beato et al., 2018; Vescovi & Favero, 2020; Zabaloy et al., 2021). Additionally, small-sided games and sprint assessments have been shown to reliably measure players' speed, agility, and technical capacity, highlighting the close interaction between physical and technical attributes in soccer (Reilly & Thomas, 2018; Rampinini et al., 2015; Stølen et al., 2020; Figueiredo et al., 2016; Rampinini et al., 2021). Comprehensive physical fitness profiling, which includes speed, strength, and agility measurements, helps predict and enhance dribbling performance in both youth and elite players, demonstrating the multidimensional nature of soccer skills (Harper et al., 2021).

Observations in the extracurricular soccer program at MTs Raden Intan Gading Rejo Lampung show that students' dribbling abilities are highly variable. Many students struggle with ball control, dribbling speed, and leg muscle strength during both practice and competition. These deficiencies highlight the need for systematic training programs aimed at improving leg muscle strength, speed, and technical dribbling skills. Therefore, investigating the contribution of leg muscle speed and strength to dribbling performance is critical to understanding how physical conditioning supports technical skill development in young soccer players, guiding training interventions and enhancing match performance.

## **2. METHOD**

This study employed a survey method, where the researchers directly observed the implementation of tests and measurements in the field. The purpose of this design is to identify whether relationships exist between variables and to determine the strength and direction of these relationships without experimental manipulation (Fraenkel et al., 2019; Johnson & Christensen, 2020). The population of this study consisted of students participating in the extracurricular soccer program at MTs Raden Intan Gading Rejo Lampung. A total sampling technique was applied, including all 22 students in the program.

Total sampling ensures that the entire population is represented in the sample, minimizing selection bias and increasing the generalizability of findings (Etikan, Musa, & Alkassim, 2016). The research instruments consisted of standardized tests to measure specific abilities. Speed was assessed using a 40-yard (36.6-meter) sprint test (Rusli & Saman, 2018), leg muscle strength was measured with a leg dynamometer, and dribbling ability was evaluated using a soccer dribble test (Nurhasan, 2017). Data analysis was conducted following prerequisite tests, including normality and linearity assessments, which are essential for validating the quality of data and ensuring the assumptions for correlational analysis are met (Field, 2018). Hypothesis testing was carried out using product-moment correlation statistics to examine the relationship between variables. Additionally, the coefficient of determination was calculated to quantify the contribution of each independent variable to the dependent variable, providing a clear understanding of how physical factors, such as leg speed and strength, influence dribbling performance.

### 3. RESULT AND DISCUSSION

#### Result

To determine the contribution of leg muscle speed and strength to the dribbling skills of extracurricular soccer students at MTs Raden Intan Gading Rejo Lampung, a description of the data for each variable is required as follows:

**Table 1.** Description of Research Data

No	Hasil	Variabel		
		Kecepatan (X1)	Kekuatan Otot Tungkai (X2)	Menggiring Bola (Y)
1	Rata-Rata	5,08	64,37	15,13
2	SD	0,35	15,64	4,57
3	Min	4,4	37,5	9,3
4	Max	5,6	86,9	22,1

The speed variable (X1) of extracurricular soccer students at MTs Raden Intan Gading Rejo Lampung shows that the average speed is 5.08 seconds, the standard deviation is 0.35 seconds, the minimum speed is 4.4 seconds, and the maximum speed is 5.6 seconds.

**Table 2.** Speed Frequency Distribution

Interval	Kriteria	Frekuensi	Persentase (%)
< 4,74	Baik Sekali	3	13,6%
4,75 – 4,98	Baik	6	27,3%
4,99 – 5,27	Cukup	5	22,7%
5,28 – 5,47	Kurang	4	18,2%
> 5,48	Sangat Kurang	4	18,2%

<b>Total</b>	<b>22</b>	<b>100%</b>
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The leg muscle strength variable (X2) of extracurricular soccer students at MTs Raden Intan Gading Rejo Lampung shows that the average leg muscle strength is 64.37 kg, the standard deviation is 15.64 kg, the minimum leg muscle strength is 37.5 kg, and the maximum leg muscle strength is 86.9 kg.

**Table 3.** *Frequency Distribution of Leg Muscle Strength*

Interval	Kriteria	Frekuensi	Persentase (%)
> 153,5	Baik Sekali	-	0%
112,5 – 153	Baik	-	0%
76,5 – 112	Sedang	8	36,4%
52,5 – 76,0	Kurang	7	31,8%
< 52	Kurang Sekali	7	31,8%
<b>Total</b>		<b>22</b>	<b>100%</b>

The dribbling ability (Y) variable for extracurricular soccer students at MTs Raden Intan Gading Rejo Lampung shows that the average dribbling ability (Y) is 15.13 seconds, with a standard deviation of 4.57 seconds, a minimum value of 9.3 seconds, and a maximum value of 22.1 seconds.

**Table 4.** *Frequency Distribution of Dribbling Ability*

Interval	Kriteria	Frekuensi	Persentase (%)
1 - 5 detik	Sangat Cepat	-	0%
6 - 10 detik	Cepat	3	13,6%
11 -15 detik	Cukup	9	40,9%
16 - 20 detik	Kurang	5	22,7%
21 – 25 detik	Kurang Cepat	5	22,7%
<b>Total</b>		<b>22</b>	<b>100%</b>

The tables above provide a description of the data results and the frequency distribution of each variable. The following are the results of the prerequisite tests, namely the normality test and the linearity test:

**Table 5.** *Normality Test*

No	Variabel	L Hitung	L Tabel	Kesimpulan
1	Kecepatan (X1)	0,107	0,173	Normal

2	Kekuatan Tungkai (X2)	Otot	0,132	0,173	Normal
3	Kemampuan Menggiring Bola (Y)		0,173	0,173	Normal

**Tabel 6.** Uji Linieritas

No	Variabel	F Hitung	F Tabel	Kesimpulan
1	Kecepatan – Menggiring Bola	1,796	3,956	Linier
2	Kekuatan Otot Tungkai – Menggiring bola	1,048	4,619	Linier

The tables above show that all variables are normally distributed, and the relationship between each independent variable and the dependent variable indicates a linear relationship. The following shows the contribution of leg muscle speed and strength to dribbling skills:

**Table 7.** Partial Contribution of Leg Muscle Speed and Strength to Dribbling Skills

No	Variabel	Korelasi	r hitung	r tabel	Kesimpulan
1	Kecepatan – Menggiring Bola	0,729	4,768	2,654	Signifikan
2	Kekuatan Otot Tungkai – Menggiring bola	0,510	2,086	2,086	Signifikan

The magnitude of the correlation/relationship (R) between speed and dribbling skills is 0.729 (strong) and is explained by the percentage of the influence of the independent variable on the dependent variable which is called the coefficient of determination which is the result of squaring R, the coefficient of determination (R) is 0.532, which means that the influence/contribution of the independent variable (speed) on the dependent variable (dribbling skills) is 53.2%, while the rest is influenced by other variables. The correlation (R) between leg muscle strength and dribbling skills is 0.510 (strong). The coefficient of determination (R) is 0.261, indicating that the independent variable (leg muscle strength) contributes 26.1% to the dependent variable (dribbling skills), with the remainder influenced by other variables.

The following table shows the simultaneous contribution of leg muscle speed and strength to dribbling skills:

**Table 8.** *Simultaneous Contribution of Leg Muscle Speed and Strength to Dribbling Skills*

Variabel	$R_{X_1X_2,y}$	$R^2$	F Hitung	F Tabel	Kriteria	Ket
X1 dan X2 – Y	0,735	0,539	11,134	3,522	Kuat	Signifikan

The magnitude of the correlation/relationship value (R) between the speed and strength of leg muscles with dribbling skills is 0.735 (strong) and is explained by the percentage of the influence of the independent variable on the dependent variable which is called the coefficient of determination which is the result of squaring R, the coefficient of determination ( $R^2$ ) is 0.539, which means that the influence/contribution of the independent variable (speed and strength of leg muscles) on the dependent variable (dribbling skills) is 53.9%, while the rest is influenced by other variables.

### Discussion

The results of the data analysis on the speed variable indicate that speed contributes to the dribbling skills of extracurricular soccer students at MTs Raden Intan Gading Rejo Lampung. This is reasonable, as dribbling movements are not only performed at low speeds but also at high speeds. Players must be able to control the ball in all transitions to ensure it doesn't lose control. Running speed is useful when dribbling at high speeds, allowing for rapid movement from one position to another, both during defense and when building attacks. The higher the speed, the better the dribbling ability.

The results show that leg muscle strength significantly contributes to dribbling skills in soccer. The magnitude of the contribution of leg muscle strength to dribbling skills in soccer is 0.1, so  $H_0$  is rejected. This means that  $H_a$ , which states that leg muscle strength contributes moderately to dribbling skills, is accepted. This means that better leg muscle strength results in better dribbling skills in soccer. This suggests that dribbling skills depend on the contribution of leg muscle strength.

There are many physical components that a player must possess in sports, including: endurance, strength, speed, agility, explosive power, flexibility, accuracy, coordination, balance, and reaction. Not all of these ten physical components must be possessed well. Some components complement the others. Looking at the characteristics of soccer, it can be concluded that the components that soccer players must have more dominant are endurance, strength, speed, coordination, and of course, without neglecting other physical components. Similarly, high school students need to play soccer, even though at their age their physical condition still requires a lot of training. These physical condition components can contribute to each player's ability to perform any movement, such as dribbling the ball.

### 4. CONCLUSION

Based on the overall findings of the study conducted at MTs Raden Intan Gading Rejo Lampung, it can be concluded that speed and leg muscle strength are important physical components that contribute to improving students' dribbling skills in soccer extracurricular activities. These two physical attributes play a complementary role in supporting students' ability to control the ball effectively while maintaining movement efficiency, balance, and coordination during play. The integration of physical conditioning, particularly exercises focused on enhancing speed and leg muscle strength, is therefore essential for developing optimal dribbling performance. Overall, the study confirms that physical fitness components

are fundamental determinants of technical skill development in soccer training among students.

The findings of this study have practical implications for coaches, physical education teachers, and extracurricular soccer instructors. Training programs should incorporate structured exercises that focus on improving speed and strengthening leg muscles, such as sprint drills, agility exercises, plyometric training, and resistance-based lower-body workouts. By systematically developing these physical components, coaches can enhance students' technical performance, particularly in dribbling, which is a fundamental skill in soccer. Furthermore, this study highlights the importance of integrating physical conditioning with technical training to achieve more comprehensive athlete development. Schools can use these findings as a reference in designing extracurricular soccer programs that are more effective, structured, and aligned with student performance development goals.

Future studies are recommended to explore additional factors that may influence dribbling skills, such as agility, balance, coordination, endurance, and cognitive decision-making abilities during gameplay. Researchers may also consider involving larger and more diverse participant samples to improve generalizability. In addition, experimental research designs examining the effectiveness of specific training interventions aimed at improving speed and leg muscle strength would provide deeper insights into causal relationships. Longitudinal studies could also be conducted to examine the long-term impact of physical conditioning programs on technical skill development and overall soccer performance.

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