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The Relationship Between Leg Length, Leg Muscle Power, and Flexibility with Shooting Ability in the Futsal Team of SMP N 4 Surakarta

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ABSTRACT

This study aims to examine the relationship between leg length, leg muscle power, and flexibility with shooting ability in the futsal team of SMP N 4 Surakarta. The research used a quantitative correlational method involving 25 male students as subjects. Data were collected through tests and measurements using a measuring tape, standing broad jump test, sit and reach test, and shooting ability test. Data analysis employed Pearson product-moment correlation and multiple regression using SPSS version 23. The results showed: (1) No significant relationship between leg length and shooting ability (sig. 0.066 > 0.05; r = 0.374). (2) A significant relationship between leg muscle power and shooting ability (sig. 0.001 < 0.05; r = 0.639). (3) A significant relationship between flexibility and shooting ability (sig. 0.004 < 0.05; r = 0.550). (4) A simultaneous significant relationship between leg length, leg muscle power, and flexibility with shooting ability (F = 8.789 > Ftable = 3.07; sig. 0.001 < 0.05), with a contribution of 55.7%. It can be concluded that leg muscle power and flexibility have a significant relationship with shooting ability, while leg length does not have a significant relationship.

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1. INTRODUCTION

Sport is a regular and planned physical activity to improve body function (Giriwoyo, 2005). One of the competitive sports that is popular with various groups is futsal. Futsal is a sport that has similarities to football; one team consists of five players, and the rest are reserve players. In this game, players must be able to keep the ball as long as possible and score goals to win (Ardiyanto, 2021).

Futsal has five basic techniques, namely passing, receiving or controlling the ball (ball control), dribbling, chipping, and shooting. In addition, the goalkeeper needs to master catching the ball, blocking, and throwing the ball (Lhaksana, 2011). Mastery of basic techniques plays a very important role in improving game performance, both in attacking and defensive patterns. Therefore, regular training to improve basic skills is one way to develop futsal playing skills.

Futsal requires players to master technical skills, game strategies, and optimal physical condition in order to achieve maximum performance. One of the important techniques in futsal is shooting, which is the player's ability to score goals. Kicking the ball towards the goal or shooting is indeed difficult to do because it requires good technique, decision-making, whether to shoot directly or pass to teammates, and is balanced with intensive training.

Many factors influence shooting ability, including leg length, leg muscle power, and flexibility, which play an important role in shooting effectiveness (Bompa & Haff, 2009).

An ideal leg length can help players kick with better power and accuracy. Players with longer legs tend to have an advantage in reaching the ball and creating more momentum in the kick, so the ball can travel fast and powerfully (Balvi & Hamilton, 2004).

Power Leg muscles play a significant role in shooting ability. Effective shooting requires enough power so that the ball can move quickly when shooting long distances or in situations that require speed of execution. The higher the power of the leg muscles, the greater the force produced, resulting in a stronger kick (Kraemer & Ratamess, 2004).

Flexibility affects shooting, especially in supporting the flexibility of leg movements when doing a more maximal leg swing. Flexible joints help players to make flexible movements and help reduce the risk of injury (Alter, 2004).

Shooting is a person's ability to shoot the ball hard with the aim of scoring goals or points. The importance of shooting in futsal matches because it is the final settlement of a game (Atmojo & Bulqini, 2019). At the junior high school level, physical potential and physical abilities are developing. This is important for understanding factors such as leg length, leg muscle power, and flexibility that affect students' shooting abilities in futsal games.

Futsal extracurricular at SMP N 4 Surakarta is one of the sports activities to develop students' talents, interests, and potential in the field of futsal. This activity is attended by male students with an interest in futsal. Futsal extracurricular at SMP N 4 Surakarta is held routinely twice a week, precisely on Monday and Wednesday, starting at half past four to five in the afternoon at the school field. The training material consists of physical training, mastery of basic techniques, match simulations, and game strategies. This activity is guided by the PJOK teacher. From all members of the futsal extracurricular, a core futsal team for boys is formed, consisting of 25 students through a selection process based on technical, tactical, physical, and mental abilities. This core team actively represents the school in various junior high school-level futsal competitions.

SMP N 4 Surakarta is known as a school that has a futsal team with a track record of achievements that is quite proud. Some of the achievements that have been achieved include Champion ITrophySMA Pelita Kasih in 2022, Champion I of Al Azhar Creativity Project, Champion I of Champs of Tomorrow at Solo Raya level in 2023. However, this year the SMP N 4 Surakarta futsal team was only able to reach the top 8 of the 2024 Solo Raya by. U Cup. This decline in achievement is an important concern because it reflects the challenges that need to be overcome in efforts to improve the skills and achievements of students who are members of the SMP N 4 Surakarta futsal extracurricular.

One aspect that affects the ability to play futsal, especially in shooting ability, is a good basic technique. However, based on the researcher's observations during the futsal extracurricular session, there were still obstacles in students' shooting abilities. When shooting, the ball often deviates, either deviating to the right or left, too high above the goal, or not entering during free kicks and penalty executions.

According to Dewi and Nindya (2020), shooting errors in adolescents are often caused by weak technique and muscle strength that has not developed optimally.

In addition to basic techniques, other factors that affect shooting ability are leg length, leg muscle power, and flexibility. These three aspects are part of the main physical condition that affects the effectiveness of a kick. Rahmadani (2020) stated that leg length is positively correlated with the strength and range of a kick. Another study by Fauzan and Lestari (2022) emphasized the importance of leg muscle power and flexibility as the main supporters of shooting quality in futsal.

Based on the problems above, researchers are interested in conducting research on the relationship between leg length and power leg muscles, and flexibility towards shooting ability in the SMPN 4 Surakarta futsal team.

2. METHODS

This study uses a correlational method with a quantitative approach. The population of the study was all male students who participated in the futsal extracurricular at SMP N 4 Surakarta. The sample used was 25 students who were members of the futsal core team, taken using a purposive sampling technique. The instruments used in this study consisted of several measuring instruments according to the variables studied. Leg length was measured using a measuring tape from the anterior superior iliac spine to the medial malleolus. Leg muscle power was measured using a standing broad jump test, while flexibility was measured using a sit and reach test. Shooting ability was measured by a shooting test towards the goal with a scoring system based on the target zone. Data were analyzed using the Pearson correlation test to determine the relationship between each independent variable and the dependent variable and multiple regression analysis to determine the relationship simultaneously using the simultaneous F test and t test with the help of SPSS.

3. RESULT AND DISCUSSION

Table 1. Descriptive Statistics Results

	N	Mean	Modus	Median	Min	Max	Std.Dev
Leg Length	25	94,80	93	95	90	100	2,61
Power Leg Muscles	25	203,40	185	200	173	235	17,95
Flexibility	25	38,22	38,50	38,50	34,00	41,00	1,68
Shooting Ability	25	4,06	4,10	4,10	3,60	4,5	0,25

Based on Table 1, the descriptive statistical results of 25 research subjects show that the leg length variable has an average value of 94.80 cm, with a standard deviation of 2.61, a minimum value of 90 cm, and a maximum of 100 cm. The leg muscle power variable has an average value of 203.40 cm with a standard deviation of 17.05, a minimum value of 173 cm, and a maximum of 235 cm. Furthermore, the flexibility value has an average of 38.22 cm with a standard deviation of 1.68, a minimum value of 34.00 cm, and a maximum value of 41.00 cm. While the shooting ability shows an average score of 4.06 with a standard deviation of 0.25, the lowest value of 3.60, and the highest of 4.5.

Table 2. Shapiro-Wilk Normality Test Results

	Kolmogorov-Smirnova			Shapiro Wilk		
	Statistics	Df	Sig.	Statistics	df	Sig.
Leg Length	.114	25	.200*	.973	25	.720
PowerLegMuscles	.126	25	.200*	.933	25	.104
Flexibility	.166	25	.073	.944	25	.185
Shooting Ability	.118	25	.200*	.963	25	.486

Based on Table 2, the significance value of the four variables is greater than 0.05 (sig. > 0.05), so that all data are normally distributed. Therefore, Pearson product moment correlation analysis and multiple linear regression can be used.

Table 3. Linearity Test Results Leg Length

			Sum of Squares	df	Mean Square	F	Sig.
Shooting Ability * Leg Length	Between Groups	(Combined)	.867	10	.087	1.987	.117
		Linearity	.207	1	.207	4,734	.047
		Deviation from Linearity	.660	9	.073	1,681	.185
	Within Groups		.611	14	.044		
	Total		1,478	24			

Table 4. Linearity Test Results Leg Muscle Power

			Sum of Squares	df	Mean Square	F	Sig.
Shooting Ability * Leg Muscle Power	Between Groups	(Combined)	1,383	18	.077	4,851	.030
		Linearity	.604	1	.604	38.152	.001
		Deviation from Linearity	.779	17	.046	2,892	.097
	Within Groups		.095	6	.016		
	Total		1,478	24			

Table 4. Linearity Test Results Flexibility

			Sum of Squares	df	Mean Square	F	Sig.
Shooting Ability * Flexibility	Between Groups	(Combined)	.707	10	.071	1.286	.707
		Linearity	.448	1	.448	8.136	.448
		Deviation from Linearity	.260	9	.029	.525	.260
	Within Groups		.095	.770	14	.055	
	Total		1,478	1,478	24		

Based on the table above, it shows that all variables have a deviation from linearity value > 0.05 so that the relationship between each independent variable and shooting ability is linear.

Table 4. Pearson Product Moment Correlation Test Results

		Shooting Ability
Leg Length	Pearson Correlation	.374
	Sig. (2-tailed)	.066
	N	25
PowerLegMuscles	Pearson Correlation	.639**
	Sig. (2-tailed)	.001
	N	25
Flexibility	Pearson Correlation	.550**
	Sig. (2-tailed)	.004
	N	25
Shooting Ability	Pearson Correlation	1
	Sig. (2-tailed)	
	N	25

Based on Table 4 shows that leg length has no significant relationship with shooting ability (r = 0.374; sig. = 0.066). Leg muscle power has a strong, significant relationship with shooting ability (r = 0.639; sig. = 0.001). Flexibility has a moderately significant relationship with shooting ability (r = 0.550; sig. = 0.004).

Table 5. Simultaneous F Test Results

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.823	3	.274	8.789	.001[b]
	Residual	.655	21	.031		
	Total	1.478	24			

a. Dependent Variable: Shooting Ability
b. Predictors: (Constant), Flexibility, Leg Length, Leg Muscle Power

Based on Table 5, the significance value is 0.001 < 0.05, so simultaneously there is a significant relationship between leg length, leg muscle power, and flexibility with shooting ability.

Table 6. Partial t-Test

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.759	1.412		-.538	.596
	Leg Length	.016	.014	.173	1.136	.269
	PowerLegMuscles	.007	.002	.476	3.011	.007
	Flexibility	.051	.023	.341	2.169	.042

a. Dependent Variable: Shooting Ability

Based on Table 6, partially the leg muscle power and flexibility variables are related to shooting ability, the t-value is 3.011 and 2.169 > 2.080 t-table. Meanwhile, the leg length variable is not related to shooting ability, because it has a t-value of 1.136 < 2.080 t-table.

Table 7. Determination Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.746[a]	.557	.493	.1766

a. Dependent Variable: Shooting Ability
b. Predictors: (Constant), Flexibility, Leg Length, Leg Muscle Power

Based on Table 7, the R Square value of 0.557 shows that leg length, leg muscle power, and flexibility together contribute 55.7%.

DISCUSSION

The results of the correlation analysis showed that leg length did not have a significant relationship with shooting ability (sig. 0.066 > 0.05). The correlation value of 0.374 indicates a low relationship. This means that leg length does not provide a significant contribution to the shooting

ability of futsal players at SMP N 4 Surakarta. In theory, leg length affects the biomechanics of kicking movements because it can increase the reach and leverage of the legs (Jati, 2011). Although in theory leg length can increase leverage and range of motion, the imperfect shooting technique factor is likely the cause of leg length not providing a real contribution.

The results of the analysis showed a significance value of 0.001 (<0.05) and a correlation value of 0.639, which is included in the strong category. This means that there is a significant relationship between leg muscle power and shooting ability. The higher the explosive power of the leg muscles, the stronger and faster the kick produced. This finding is reinforced by Sukoco's research (2013), which shows a significant relationship between leg muscle explosive power and shooting accuracy in futsal players. Leg muscle power allows players to perform explosive movements quickly and effectively, especially when shooting which requires high strength in a short time.

Flexibility is also significantly related to shooting ability. A significance value of 0.004 (<0.05) and a correlation of 0.550 indicate that there is a significant relationship between flexibility and shooting ability. Flexibility supports flexibility of movement and increases the range of motion, especially when swinging the leg when kicking the ball. Yulianto's research (2017) proves that flexibility, together with muscle power and eye-foot coordination, contribute to shooting accuracy. Players who have good flexibility tend to be better able to perform shooting movements with optimal technique and minimal movement obstacles. This is important for young players, because their flexibility is developing.

Overall, these three variables show a positive contribution to shooting ability, with leg muscle power providing the greatest contribution, followed by flexibility, and finally leg length. This strengthens Sajoto's theory (1998) that power and flexibility are the main components of physical condition that support technical skills such as kicking the ball.

4. CONCLUSION

Based on the results of the analysis and discussion, it can be concluded that; (1) there is no significant relationship between leg length and shooting ability (sig. 0.066; r = 0.374), (2) there is a significant relationship between leg muscle power and shooting ability (sig. 0.001; r = 0.639), (3) there is a significant relationship between flexibility and shooting ability (sig. 0.004; r = 0.550), (4) simultaneously, leg length, leg muscle power, and flexibility have a significant relationship to shooting ability (sig. 0.001; Fcount 8.789 > Ftable 3.07), with a contribution of 55.7%.

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