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Examining The Leg Muscles' Explosive Powers Impact to Smash in Female Volleyball Athletes

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Abstract

Leg muscle explosive power is important to achieve effective smashes in volleyball games. This study reveals the leg muscle's explosive power and smash ability level and determines the correlation between the two variables. The method utilized is descriptive quantitative with a correlation approach. The population in this study were all female volleyball extracurricular participants at SMK Negeri 4 Lubuklinggau City. Data collection techniques and instruments used vertical jump tests and volleyball smash tests. Data analysis using SPSS software stated that leg muscle explosive power was at a low level of as much as 56%, smash ability was at a moderate level of as much as 37%, and a good level of as much as 7%, and there was a significant positive relationship. Based on the results of this study, it is recommended that extracurricular coaches should develop training programs to increase muscle explosive power.

Keywords: *Leg Power, Smash, Volleyball.*

INTRODUCTION

Volleyball is a popular game regardless of rural-urban area or social status. Various amateur and professional football clubs are growing and are easy to find in various areas. Numerous volleyball clubs indicate the public's interest in volleyball has increased (Hidayat et al., 2021). At the secondary school level or equivalent level of education, it also illustrates that students are interested in following volleyball

sports. At the national level, the national volleyball team has repeatedly won volleyball championship matches from the Southeast Asia regional region to the world championship (Sahabuddin et al., 2023).

The development of volleyball achievements has been initiated at the school level through extracurricular activities. The main goal of extracurricular sports is to provide

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opportunities for all students to channel and develop their sports talents

. The athletes trained to master the basics of the sport to master volleyball correctly and perfectly. The main basic skill in volleyball is the smash technique. Smash is a continuous movement to attack that aims to win the games (Montesano & Mazzeo, 2018). The main goals are destroying the rival's strategy, scoring points, and winning (Suhairi et al., 2020).

Implementing the smash technique should consider several steps, such as jumping, hitting the ball with the hand while flying, and landing properly to avoid injury (Yulianti, 2017). Smash development also requires adequate body condition to provide extraordinary smash results. Body conditions include foot agility, body balance, leg and hand strength, movement coordination, heart endurance, body flexibility, and reaction speed to overcome unexpected ball conditions (Hasugian & Siregar, 2022).

Smashing in volleyball requires the leg muscles' explosive powers to produce a good jump (Qudsi et al., 2021). The leg muscles' low explosive power will impact improper attachment and smashing (Aguss et al., 2021). Perfect smashing in volleyball will be achieved if the leg muscles are stronger than before, the ball's reach is longer, and the jump is higher during the smash. Good jump resistance, speed, and flexibility from movement through strong joint motion require leg muscle strength (Adnan, 2019).

Based on the results of an interview with female athlete trainer Rika Aprilia, it is stated that there were 16 female volleyball extracurricular participants from seventh to ninth grade. Volleyball practice is held twice a week, and several points of observation information are acquired. First, students look proficient in playing volleyball, but on Smash, many messy students still need to learn how to start, refuse to jump, and hit the ball while on the field. Second, the student's abilities varied in doing volleyball smashes. Third, some students who were successful in smash*ing* missed the target with a low jump. The impact is that they got out of the ruler field and even entered the net because their jump was unheightened enough. Fourth, failure to smash is also the result of a bad jump.

This study was conducted to determine the relationship between female athletes' power and smash ability at SMK Negeri 4 Lubuklinggau City. It is important to streamline the form of training that will be given. In addition, athletes are expected to have good physical and technical abilities in volleyball to improve athlete achievement. Through this research, results that show athletes' ability will be obtained to provide the right solution.

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This research was also conducted to complete the previous research about female volleyball

athletes, specifically student-athletes. This study also analyzed the relationship between leg muscle explosive power and the ability to smash women's volleyball at SMK Negeri 4 Lubuklinggau City. This result research can be utilized as a basis for developing a training program to improve the quality of volleyball

games.

METHOD

The method implemented in this study is descriptive quantitative with a correlational approach. According to Sugiyono (2019), correlation research is a type of research that aims to reveal the degree of relation between the variables studied. This research was carried out at State Vocational School 4 Lubuklinggau City in April 2023. All 16 female volleyball extracurricular participants were involved as the study population. The use of samples in this study refers to total sampling, a sampling technique that includes all population members as the research sample. Several stages of the procedure must be passed to complete the required research data. This step includes ensuring the research variables to be studied, selecting the required research instruments, coordinating with athletes and coaches for data collection, collecting explosive power data using the vertical jump test, collecting data on smash ability with the volleyball smash test, data verification, data analysis, and compiling research reports.

Table 1. Vertical Jump Test Norms

No	Category	Score (cm)
1	> 43	Extremely Good
2	38 – 42	Good
3	33- 37	Medium
4	20 – 32	Low
5	7 – 19	Extremely Low

Table 2. Volleyball Smash Skill Test Scoring

Male	Female	Score
>22	>21	5
18 – 21	16 – 20	4
12 – 17	10 – 15	3
8 – 11	7 -9	2
<7	<6	1

Source: (Saparia, 2020)

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The techniques and instruments utilized were the vertical jump and volleyball smash tests. To analyze the research data using SPSS software version 16 by using the normality test to determine the distribution of normal data. The linearity test determines the linear relationship between the dependent variable and each independent variable to be tested, and the correlation test measures how strong the relationship between the two variables is.

RESULT

Table 3. The result of leg power

No	Interval (cm)	Category	Frequency	Percentage
1	> 43	Extremely Good	0	0 %
2	38 – 42	Good	1	7 %
3	33- 37	Medium	6	37 %
4	20 – 32	Low	9	56 %
5	7 – 19	Extremely Low	0	0
	Total		16	100

Based on the results shown in Table 1, information was obtained that most of the explosive power abilities of the leg muscles were in the low category.

Table 4. The result of the smash

No	Interval (cm)	Category	Frequency	Percentage
1	22-25	Extremely Good	0	0 %
2	19-21	Good	2	12 %
3	12-18	Medium	10	64 %
4	9-11	Low	2	12 %
5	5-8	Extremely Low	2	12%
	Total		16	100

Based on the results shown in Table 2, the smash abilities of extracurricular participants were in the medium category. Visually, the results of the explosive power of the leg muscles and the extracurricular participants' smash ability can be illustrated in Figure 1 below.

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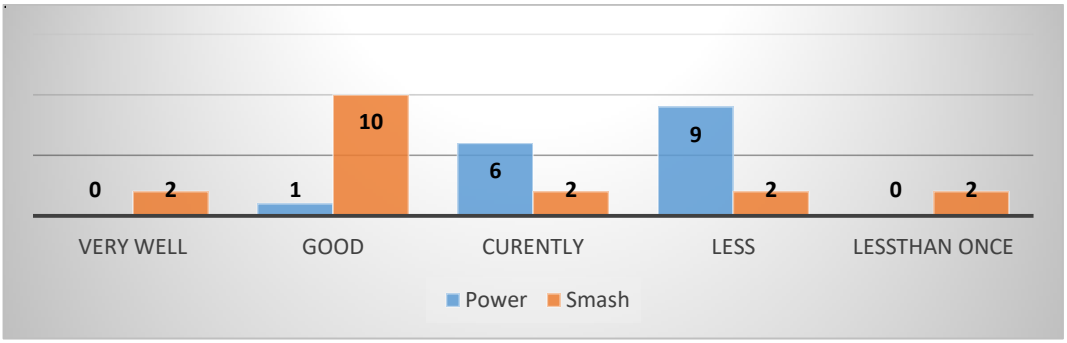

Figure 1. Graph of Equations Between Variable

The initial step was to conduct a prerequisite test to conduct a correlation analysis between variables in this study. This step specifically focuses on the normality and linearity tests. The SPSS software analyzes the data—the normality test by operating the Kolmogorov-Smirnov Test. The results of the test are presented in Table 3.

Table 3. Normality Test

Kolmogorov Smirnov Test	Sig.
Test Statistic	.112
Asymp. Sig. (2-tailed)	.200[c, d]

The Kolmogorov-Smirnov test results in Table 3 show that the sig. of .200 is greater than 0.05. Based on the provisions of the normality test, the data is declared normal so that it is feasible to proceed to the next linearity test. The results of the linearity test are shown in Table 4.

Table 4. Linearity Test

		Sig
Between Groups	*(Combined)*	.021
	Linearity	.000
	Deviation from Linearity	.868

Based on the results of the linearity test, it is stated that the sig. Deviation from linearity is .868, meaning the value is greater than 0.05. The residual values are linearly distributed, or it can be concluded that there is a significant correlation. After the two main prerequisites are declared following the provisions, a correlation analysis is followed to determine the level of correlation between variables. The results of the correlation analysis are shown in Table 5.

Table 5. Correlation Test

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		Power	Smash
Power	*Pearson Correlation*	1	.941**
	Sig. (2-tailed)		.000
	N	16	16
Smash	*Pearson Correlation*	.941**	1
	Sig. (2-tailed)	.000	
	N	16	16

The final result of testing using the Pearson correlation equation is .941. These results indicate a high degree of relationship between the two variables. From the results of significance, it is also stated that there is a significant correlation between the explosive power of the leg muscles and the volleyball smash, with a significance value of 0.05 <0.00.

DISCUSSION

This study aims to reveal the level of leg muscle explosive power and volleyball smash ability and to analyze the relationship between the two variables. Leg muscle explosive is a power that results from a combination of strength and speed (Sihombing, 2019). Female volleyball extracurricular participants have leg muscle explosive power in the less category. The explosive power of the leg muscles is the ability retained by female volleyball extracurricular participants to make jumps as hard and fast as possible. The explosive power of the leg muscles can be noticed from indicators such as the height of the jump and how fast it responds to external stimuli (França et al., 2021).

The low explosive power of the leg muscles retained by female extracurricular participants aligns with previous research (Sari & Soegiyanto, 2022), which revealed that female volleyball extracurricular participants tend to have leg muscle explosive power in the lesser category. Some factors that cause the non-optimal explosive power of the leg muscles include the lack of plyometric training. Various research results show that plyometric training significantly impacts the explosive power of the limb muscles of volleyball players (Yanti et al., 2021; Asota et al., 2022).

The analysis shows that female volleyball extracurricular participants at SMK Negeri 4 Lubuklinggau City have smash abilities in the medium category. Smash in volleyball is utilized as an exertion driven by players to score. For beginner volleyball

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players, smashing is a difficult specialty to accomplish. Volleyball players must maintain several physical components to accomplish smashes, including leg muscle explosive power, eye and hand coordination, accuracy, and arm muscle power (Komaini et al., 2022). If we analyze one of the factors, the low ability to smash is due to the low explosive power of the leg muscles retained by volleyball extracurricular participants at SMK Negeri 4 Lubukliinggau City. Therefore, it is necessary to do exercises to increase power. Improving volleyball smash ability must be planned through systematic and sustainable training stages (Hasugian & Siregar, 2022).

From the statistical analysis results with the help of SPSS software, it is comprehended that there is a positive significant correlation between leg muscle explosive power and smash ability. Smash is a basic volleyball technique identified with fast movements and strong punches (Bujang et al., 2019). A perfect smash should begin with a jumping motion, which requires the explosive power of the leg muscles in the jumping motion. In other words, if a player has good leg muscle explosive power, then the player has a great chance of achieving a perfect smash. The study results show that the greater the explosive level of a player, the better her ability to smash. The ability to smash and hit the ball in the right direction with great power and optimal jumping power (Marpaung & Priyonoadi, 2020).

This study is limited to the number of variables and samples, so the results cannot be generalized to different sample characters. For further research, discuss the factors influencing low leg muscle explosive power level and smash ability. In addition, it is hoped that future researchers will use a larger sample size.

CONCLUSION

Through a series of research processes and data analysis, it was concluded that female volleyball extracurricular participants at SMK Negeri 4 Lubuklinggau City had a level of leg muscle explosive power in the low category and smash ability in the moderate category. Furthermore, there was a significant positive relationship between the two variables. It is recommended for further research to apply training methods to increase power to support athletes' smash skills, especially female athletes.

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