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Correlation of Leg Muscle Power with Smash Skills in STKIP PGRI Bangkalan Students

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ABSTRACT

This study aims to determine the correlation between leg muscle power and smash skills in STKIP PGRI Bangkalan students. The background of this study is based on the importance of the role of leg muscle explosive strength in supporting the ability to smash in volleyball games. This study uses a quantitative approach with a correlational method. The research subjects amounted to 24 students. Data were collected through a leg muscle power test using a vertical jump and a smash skill test. The results showed a significant relationship between leg muscle power and smash skills. Students with high leg muscle power tend to have better smash skills compared to students who have low leg muscle power. This finding confirms that leg muscle power is one of the important factors in supporting the effectiveness of smash in volleyball. Therefore, coaches and physical education lecturers are advised to provide a special training portion to increase leg muscle power as part of a program to improve volleyball playing skills.

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INTRODUCTION

Sport has an important role in supporting the quality of life to keep the body fit and healthy (Zubaida, Fernanda, & Firdaus, 2022). Sport is one of the important activities in supporting the development of healthy, resilient, and competitive humans. In the world of sports, especially volleyball, technical ability and physical condition are the two main aspects that are interrelated in supporting athlete performance. One of the basic techniques that plays a crucial role in volleyball is the smash, which is a hard and sharp blow directed at the opponent's court to score points. Volleyball is more than just the action of hitting the ball; behind the game are technical skills and strategies that must be mastered (Riyanto & Mulyana, 2024). Through sports, individuals not only build a strong physique but also develop character, discipline, and teamwork. In this

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sport, players must master various basic techniques, such as passing, serving, blocking, and especially smashing, which serves as the main attack to gain points.

Smash in volleyball is an attacking technique that demands strength, speed, and accuracy. Smash is an important effort to score points in a volleyball game. Therefore, the smash must be able to confuse and complicate the opponent's block (Nurfalah, Hanif, & Satyakarnawijaya, 2019). This can be achieved through high pass and smasher speed, as well as a variety of attacks, including the use of players from a back position (back attack), which is difficult for the opponent to block. To master smash well, arm muscle strength is needed so that the blow can be hit hard and on target, as well as the explosive power of the leg muscles to support a high jump when doing smash (Isabella & Bakti, 2021). To be able to perform an effective smash, a player must have a good physical condition, especially leg muscle strength and power. Leg muscle power is the ability of the leg muscles to produce explosive power, which is needed when the player makes a high and fast jump before hitting the ball. Without adequate leg power, players will find it difficult to reach the required height, so the resulting smash is not optimal or even easily blocked by the opponent.

Therefore, smash skills are closely related to the physical components of players, including strength, flexibility, and coordination of leg muscles. Leg muscle power is the ability of the muscles in the legs to produce explosive movements, especially when jumping (Wismiarti & Hermanzoni, 2020). Effective smashing requires coordination of various parts of the body, especially leg muscle power. Leg muscles play an important role in providing a vertical push when the player jumps before hitting the ball. The greater the leg muscle power possessed, the higher and stronger the jump made, so that the quality of the smash increases. Because volleyball is a game that takes place at a high tempo, attacking techniques tend to be more prominent than defensive techniques (Cirana, Hakim, & Nugroho, 2021). Therefore, smash is considered a complex technique because it requires the integration of various physical and motor components (Sasmita, Welis, Rifki, Rasyid, & Ockta, 2023). Students who master smash skills well will be more competitive in the game because they are able to put pressure on the opponent's defence and spearhead the team's attack.

In volleyball, for example, to master the smash technique, a player must have good leg strength, arm strength, and endurance in order to be able to jump high and hit the net optimally (Nanda & Aziz, 2020). The smash movement begins with short steps to gain momentum, followed by an explosive repulsion using both legs to produce a high jump. Strong leg muscle power allows players to reach maximum height when jumping, thus having a better angle and time in hitting the ball towards the target. Not only that, stability when landing and transitioning to the next position is also influenced by leg muscle strength and control. Leg strength plays an important role in both attack and defence. Explosive power (power) itself is one of the ten components of physical condition, which is defined as the ability of muscles to overcome resistance through very fast contractions (Adhi, Sugiharto, & Soenyoto, 2017). In order to master the smash technique optimally, arm muscle strength is needed to produce a hard and targeted

blow, as well as leg muscle power to support high jumps when doing smash (Wismiarti & Hermanzoni, 2020).

A volleyball player will find it easier to smash if he has a high jump and optimal leg muscle explosiveness. Through the application of the applied training, it is hoped that the player's ability to hit smash shots can increase (Arizal & Lesmana, 2019). A player who has good leg muscle power will be faster in making the transition of movement from a stationary position to a jumping position, and be able to maintain balance when smashing in the air. This certainly increases the effectiveness of smash techniques, both in terms of ball speed, direction placement, and the ability to avoid opponent blocks. Based on this, it is important to conduct research that examines the relationship between leg muscle power and smash skills in STKIP PGRI Bangkalan students. This research aims to provide a deeper understanding of how physical abilities, especially leg muscle power, can affect smash technique performance. The findings from this study are expected to be the basis for designing more effective training programs, focusing on strengthening leg muscles to improve technical skills. Thus, students not only develop in terms of game techniques but also in terms of physical fitness, which is the main foundation in the sport of volleyball. The results of this study can also contribute to the development of coaching science and sports education learning in the campus environment and the wider community.

METHODS

This type of research is quantitative research with a correlational approach. Correlational research aims to reveal the relationship between variables naturally, without intervention or manipulation of the variables studied (Aida, Hermina, & Norlaila, 2025). This study aims to determine the relationship between leg muscle power and smash skills in volleyball games for STKIP PGRI Bangkalan students. This approach is used to determine the extent of the relationship between two variables, namely leg muscle power (as an independent variable / X) and smash skills (as the dependent variable / Y). The population of this study were STKIP PGRI Bangkalan students. Meanwhile, the sample used was purposive sampling. To measure both variables, the following instruments were used: Leg muscle power is measured using the vertical jump test, with units of measurement in centimetres. And smash skills are measured using smash skill observation sheets, which include aspects of strength, accuracy, and smash execution techniques, with an assessment score based on a rubric of certain criteria. Data collection techniques are taken from the results of jump height as an indicator of leg muscle power. And smash skill tests through direct observation when participants perform smash, assessed by three assessors (observers) to maintain objectivity. The data obtained was analyzed using the Pearson Product-Moment correlation technique to determine whether there is a relationship between leg muscle power and smash skills. In this study, the Pearson Product Moment Correlation (r) statistical test was used to measure the degree of closeness of the relationship

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between variables X and Y which is shown through the correlation coefficient (r), where the relationship can be positive or negative, with the basis for decision making, namely if the significance value is <0.05, it is stated that there is a relationship, while if> 0.05, there is no relationship, and if it is exactly 0.05, a comparison is made between the calculated r value and the r table, namely if r count is greater than r table, there is a relationship, otherwise if it is smaller, there is no relationship, and guidelines for the degree of relationship between variables are shown in Table 1. as a reference in interpreting the strength of the correlation.

Table 1.
Guidelines for Degree of Relationship

Coefficient Interval	Degree of Relationship
0,00-0,199	Very Weak
0,20-0,399	Weak
0,40-0,599	Medium
0,60-0,799	Strong
0,80-1,000	Very Strong

Before the analysis, the data were first tested for normality and linearity to ensure that the data met the requirements of the correlation test. The analysis was carried out with the help of statistical programs such as SPSS software.

RESULTS AND DISCUSSION

The results of research on the relationship between leg muscle power and smash skills in STKIP PGRI Bangkalan students. Data were obtained through measurement of leg muscle power using the vertical jump test and assessment of smash skills through a volleyball game practice test. Performing smashes in a match situation is not an easy thing, because it is influenced by constantly changing conditions and game situations. However, this moment can be optimally utilized by Smasher players and the opposing team as an opportunity to score points (Sulistiadinata & Purbangkara, 2020). The results obtained were then analyzed to see whether or not there was a correlation between the two variables. The presentation of data in this chapter includes the mean value, standard deviation, and correlation statistical tests used to answer the formulation of problems and research objectives. Number of samples: 25 male students. Research objectives: To know the relationship between leg muscle power and smash skills in volleyball games.Data collection method: (1) Leg muscle power measured using vertical jump test (in cm), and (2) Smash skills are measured using the smash technique assessment rubric (maximum score 100)

Table 1.
Descriptive Statistics of Leg Muscle Power and Smash Skills (N = 25)

Variable	Minimum Value	Maximum Value	Average	Standard Deviation
Leg Muscle Power (cm)	42	68	55,2	6,7
Smash Skills (score)	60	92	76,8	8,5

Table 2.
Pearson Correlation Test Results between Leg Muscle Power and Smash Skills

Variable X	Variable Y	r (Correlation)	Sig. (p-value)	Interpretation
Leg Muscle Power	Smash Skills	0,721	0,000	Strong correlation, significant

Descriptive Data

Based on descriptive statistical data, students' leg muscle power values ranged from 42 cm to 68 cm, with an average of 55.2 cm. This shows that, in general, students have fairly good explosive strength of the leg muscles. While the smash skill scores ranged from 60 to 92, with an average of 76.8, indicating that most students have mastered the smash technique at a moderate to good level.

Correlation Analysis

The Pearson correlation test results show a value of r = 0.721 with a significance (p-value) = 0.000, which means that there is a strong and significant relationship between leg muscle power and smash skills. This means that the higher the students' leg muscle power, the better their smash skills.

Interpretation

Leg muscle power is very important in smashing because this movement requires a strong vertical jump to reach the maximum height when hitting the ball. These results support the theory that leg explosive ability is one of the main factors in the success of smash techniques, especially in volleyball.

This study aims to determine the relationship between leg muscle power and smash skills in male students in volleyball games. Based on the results of data processing on 25 students, it was found that there was a strong and significant relationship between the two variables, with a Pearson correlation value of r = 0.721 and significance p = 0.000. This shows that the greater the leg muscle power that students have, the higher the level of smash skills they achieve.

The Importance of Leg Muscle Power in Smash

The smash movement in volleyball is an attack technique that relies heavily on the explosive power of the leg muscles, especially in the jumping phase. Smash is an attempt to score points in a volleyball game, so its implementation must be able to confuse and complicate the opponent's block. For this reason, speed is needed between the bait and the smasher and a variety of attacks, including utilizing players from the back position (back attack), which tends to be difficult for the opposing team's blockers to block (Nurfalah, Hanif, & Satyakarnawijaya, 2019)A player must be able to jump high to get the best angle to hit the ball. Therefore, vertical jump height is an important indicator in assessing leg strength relevant to smash skills.

The average result of the students' leg muscle power in this study was 55.2 cm, which fell into the fair to good category. This value is in line with the average smash skill of 76.8 points, which indicates that the smash technique has been well mastered by most students. Both are moving in the same direction, indicating a strong relationship.

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Consistency with Previous Research

These results are in line with previous studies that have shown that the explosive strength of the leg muscles directly contributes to vertical jump performance and attacking ability in volleyball. For example, plyometric exercises such as squat jump, tuck jump, or box jump have been shown to increase jump height and smash effectiveness. This means that physiological factors such as leg muscle strength cannot be ignored in the development of technical skills.

Implications for Learning and Training

Based on these findings, coaches and sports education lecturers need to include a specific leg muscle power development program in the curriculum for learning volleyball techniques, either through bodyweight, plyometric, or high-intensity light weight training. By increasing leg muscle power, students not only improve their technical abilities, such as smash, but also their overall performance in the game.

CONCLUSION

Based on the results of the analysis and discussion that have been carried out, it can be concluded that there is a significant positive correlation between leg muscle power and smash skills in STKIP PGRI Bangkalan students. The greater the leg muscle power possessed by students, the better their ability to smash. This shows that the explosive power of the leg muscles plays an important role in supporting the quality and accuracy of smash techniques in volleyball games. Thus, exercises that focus on developing leg muscle power are highly recommended in the learning and training process of volleyball to improve playing skills, especially in smashing.

REFERENCES

Adhi, B. P., Sugiharto, & Soenyoto, T. (2017). Pengaruh Metode Latihan Dan Kekuatan Otot Tungkai Terhadap Power Otot Tungkai. Journal Of Physical Education And Sports, 7-13.

Aida, Hermina, D., & Norlaila. (2025). Jenis Data Penelitian Kuantitatif (Korelasional, Komparatif, Dan Eksperimen). Al-Manba, Jurnal Ilmiah Keislaman Dan Kemasyarakatan, 31-40.

Arizal, Y., & Lesmana, H. S. (2019). Pengaruh Latihan Plyometric Terhadap Kemampuan Smash Bolavoli. Jurnal Patriot, 1124-1138.

Cirana, W., Hakim, A. R., & Nugroho, U. (2021). Pengaruh Latihan Drill Smash Dan Umpan Smash Terhadap Keterampilan Smash Bola Voli Pada Atlet Putra Usia 13-15 Tahun Club Bola Voli Vita Solo Tahun 2020. Jurnal Penelitian Ilmiah Penjas, 1-11.

Isabella, A. P., & Bakti, A. P. (2021). Hubungan Daya Ledak Otot Tungkai Dan Kekuatan Otot Lengan Terhadap Accuracy Smash Bolavoli. Jurnal Kesehatan Olahraga, 151-160.

Nanda, S., & Aziz, I. (2020). Tinjauan Tingkat Kondisi Fisik Pemain Bolavoli Putra Sma 2 Pariaman. Jurnal Performa Olahraga, 32-48.

Nurfalah, S., Hanif, A. S., & Satyakarnawijaya, Y. (2019). Model Latihan Smash Dalam Permainan Bola Voli Untuk Pemula. Jurnal Pendidikan Olahraga, 15-26.

Riyanto, A. I., & Mulyana, N. (2024). Model Latihan Drill Guna Meningkatkan Akurasi Open/Spike Dalam Permainan Bola Voli Pada Ekstrakurikuler Bola Voli Di Sma Negeri 1 Kadugede. Journal Of S.P.O.R.T (Sport, Physical Education, Organisation, Recreation, And Training), 828-844.

Sasmita, K., Welis, W., Rifki, M. S., Rasyid, W., & Ockta, Y. (2023). Pengaruh Latihan Drills For Gamelike Situation Dan Drills Under Simplified Conditions Terhadap Kemampuan Smash Bola Voli. Gelanggang Olahraga: Jurnal Pendidikan Jasmani Dan Olahraga, 11-19.

Sulistiadinata, H., & Purbangkara, T. (2020). Hubungan Kekuatan Otot Lengan, Koordinasi Mata Tangan, Dan Rasa Percayadiri Dengan Keterampilan Smash Pada Permainan Bola Voli. Jurnal Master Penjas & Olahraga, 32-38.

Wismiarti, & Hermanzoni. (2020). Pengaruh Kekuatan Otot Lengan Dan Daya Ledak Otot Tungkai Terhadap Kemampuan Smash Bolavoli. Jurnal Patrio, 654-668.

Zubaida, I., Fernanda, R. A., & Firdaus, W. N. (2022). Olahraga Kesehatan : Memasyarakatkan Olahraga Untuk Peningkatan Kesehatan. Journal Of Sport Science And Tourism Activity (Josita), 15-21.