THE CONTRIBUTION OF ARM MUSCLE STRENGTH AND BACK MUSCLE STRENGTH TO VOLLEYBALL TOP SERVE SKILLS

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ABSTRACT

This study aims to determine how much the contribution of arm and back muscle strength to volleyball serve in
Semester 1 Physical Education students of Bengkulu University. This study used statistics with product moment
correlation techniques and multiple correlations. This research is objective, and the sample consists of 30 students
of Semester 1 Physical Education of Bengkulu University, who were taken with a total sampling technique. There
is a significant relationship between X1 and X2 with Y, because the result of the data recalculate = 0.82 is greater
than rtable = 0.361. There is a contribution between arm muscle strength, back muscle strength on volleyball top
serve by 67% because K = r2 x 100% = 67%.

Keywords: strength; arm muscles; back muscles; Volleyball Top Service.

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INTRODUCTION

The purpose of sports coaching is to improve physical and spiritual fitness and sports achievement. Competitive sports are sports whose athletes develop and develop further in the game in a directed, gradual, and continuous manner to achieve success with the support of science and technology (Shanty et al., 2021). To achieve optimal achievement, sports coaching from a sports organization is needed. The competition is then held gradually and continuously as a benchmark for the success or failure of sports training carried out.

The growth and development of sports is a shared responsibility of the central and local governments through existing parent organizations to achieve excellence, including volleyball. Applying training principles correctly will give athletes a better training program and better training performance (Barnanda Rizky et al., 2023).

Volleyball is a game intended to entertain and improve achievements, based on the basic principle of throwing the ball to other players in a row as many as three times, immediately passing through the net and into the opponent's area (Supriyanto & Martiani, 2019).

At the University of Bengkulu, the development of volleyball is intensively promoted with the aim of improving achievement and acquisition of physical education abilities. Coaching activities in physical education classes at Bungkulu University are carried out through extracurricular activities held once a week. Instructors who act as coaches and coaches provide instruction with the aim of improving students' volleyball playing skills. In this volleyball lesson, you need to learn various basic volleyball techniques such as serve, pass, smash, and block. This training will help you apply what you have learned effectively. Based on this, children must be educated through coaching (Rizky et al., 2023).

Volleyball games consist of several techniques, namely serve, underpass, upper pass, punch, and block (Supriyanto & Martiani, 2019). This sport is classified as a luxury sport because it requires many adequate facilities and infrastructure so that this game can be carried out. (Rizky, Arwin, et al., 2023). Each student must master the basic techniques listed above and create coordination that helps them score points while playing. But in fact in this field there are still many students who just want to learn smash techniques compared to other techniques. Though the most important thing in a volleyball game is the mastery of the serve, not the smash. A serve is the first type of attack you have to do to keep playing and score points. Each student must master serving techniques to participate and continue the game. Elements of motion in volleyball games include throwing, swinging, hitting, and jumping. (Syaleh, 2017). The importance of basic movements has a huge impact on academic progress and encourages children's growth and development (Rizky, Habibie, et al., 2023).

Furthermore, it can be concluded that the service technique is the most basic technique that must be mastered by every student in order to continue the game. The serve is the first form of attack in a volleyball match. When learning this service technique, you need to consider several things to achieve good service. This includes the physical needs that support the operation of the waiter itself. Arm strength, back muscle strength, leg strength, coordination and accuracy of motion.

Without arm muscle strength, the ball will not reach the opponent’s base and the attacking team will not be able to score points. Arm strength is the ability of arm muscles to generate tension and lift weights with resistance (Supriyanto & Martiani, 2019). Weak back muscles will affect the sharpness of the ball you serve. Back muscles are central muscles that are in charge of keeping the body straight, in addition to abdominal muscles which play a very important role in posture and spinal movement (Shanty et al., 2021). Weak leg muscles will affect the direction of ball speed, making it rotate when hit. If the body movements on the arms, back, and legs are not coordinated, then the ball will not hit the target or even penetrate the net.

Conversely, if the accuracy of the server is low, it will affect the direction of the ball and can cause the ball to miss. According to (Sahabuddin et al., 2021) Strength states that it is the ability of a muscle to exert maximum force in a very short period of time. The serve is one of the elements available at the beginning of the game and is done from above (Rusli, 2022). Based on the explanation above, research on how much the contribution of arm and back muscle strength to the serve of volleyball may be of interest to researchers.

METHOD

This study used a correlation test to test the relationship between the independent variable and the dependent variable. Research is a process of collecting and analyzing data carried out systematically and logically to achieve certain goals (Oddie Barnanda Rizky et al., 2024). According to (Gazali, 2016) The purpose of correlational research is to find out whether there is a relationship, how close it is, and whether the relationship is
meaningful.

The same thing is conveyed according to (Sahabuddin et al., 2021) Correlational research is research that studies the relationship between one or more variables with other variables and simultaneously analyzes the contribution of the magnitude of the influence of the independent variable to the dependent variable. The type of research used is correlational research (quantitative research) which aims to study the relationship between independent variables and dependent variables. (Bachtiar, 2022) Correlation research refers to a general research approach that focuses on assessing covariations between naturally occurring variables. In this study there were two variables that were linked: the independent variable and the dependent variable. According to (Dwijayanti, 2017) A research variable is an attribute, characteristic, or value in a person, thing, or activity that has certain variations determined by researchers to examine it and draw conclusions. The independent variable in this study was arm and back muscle strength, and the dependent variable was volleyball serve skills. This research was conducted on first-semester sports students of Bengkulu University. This study uses statistics using product moment correlation techniques and multiple correlations. The research is objective and based on a sample of 30 first-semester sports students of Bengkulu University.

RESULTS AND DISCUSSION

A. Result

1. Description of Research Data

Based on the design in the study as well as the literature review above, data analysis for all three variables was carried out. Arm muscle strength as well as back muscle strength are considered independent variables, while volleyball’s top serve skills are considered dependent variables. The following is the sequence of forms of assessment of the test results of the three variables:

a. Arm muscle strength test results (X1)

Frequency distribution of arm muscle strength test results (X1) which has an absolute number of frequencies, which is 30 and a relative frequency of 100%. The following is the description of the frequency distribution of arm muscle strength test results (X1) based on the test results 1.0-1.6 has an absolute frequency, which is 3 and a relative frequency, which is 10%. Furthermore, test results of 1.7-2.3 have an absolute frequency, which is 6 and a relative frequency, which is 20%. Furthermore, test results of 2.4-3.0 have an absolute frequency, which is 9 and a relative frequency, which is 30%. Furthermore, test results 3.1-3.7 have an absolute frequency, which is 0 and a relative frequency, which is 0%. Furthermore, test results of 3.8-4.4 have an absolute frequency, which is 8 and a relative frequency, which is 26.7%. Furthermore, test results of 4.5-5.1 have an absolute frequency, which is 4 and a relative frequency, which is 13.3%.

b. Back Muscle Strength Test Results (X2)

Frequency distribution of back muscle strength test results (X2) which has an absolute number of frequencies, which is 30 and a relative frequency of 100%. The following is the description of the frequency distribution of back muscle strength test results (X2) based on test results 1.0-1.6 has an absolute frequency, which is 1 and a relative frequency, which is 3.33%. Furthermore, test results of 1.7-2.3 have an absolute frequency, which is 5 and a relative frequency, which is 16.67%. Furthermore, test results of 2.4-3.0 have an absolute frequency, which is 8 and a relative frequency, which is 26.67%. Furthermore, test results 3.1-3.7 have an absolute frequency, which is 0 and a relative frequency, which is 0%. Furthermore, test results of 3.8-4.4 have an absolute frequency, which is 11 and a relative frequency, which is 36.67%. Furthermore, the test results of 4.5-5.1 have an absolute frequency, which is 5 and a relative frequency, which is 16.66%.

c. Top Service Skill Test Results (Y)

The frequency distribution of upper service skill test results (Y) which has an absolute number of frequencies, which is 30 and a relative frequency of 100%. The following describes the frequency distribution of upper service skill test results (Y) based on test results 2.6-2.5 has an absolute frequency, which is 1 and a relative frequency, which is 3.33%. Furthermore, test results of 2.6-3.1 have an absolute frequency, which is 6 and a relative frequency, which is 20%. Furthermore, test results from 3.2 to 3.7 have an absolute frequency, which is 0 and a relative frequency, which is 0%. Furthermore, test results of 3.8-4.3 have an absolute frequency, which is 11 and a relative frequency, which is 36.67%. Furthermore, test results of 4.4-4.9 have an absolute frequency, which is 0 and a relative frequency, which is 0%. Furthermore, test results of 5.0-5.5 have an absolute frequency, which is 12 and a relative frequency, which is 40%.
2. Research Data Analysis
   a. Data Normality Test
      Results of normality test data on variable arm muscle strength (X1) has an L-Count of 0.132 and an L-Table of 0.161 with normal information. Furthermore, the results of the normality test data on the variable of back muscle strength (X2) has an L-Count of 0.145 and an L-Table of 0.161 with normal information. Therefore, the results of the data normality test on the upper passing skill variable (Y) have an L-Count of 0.159 and an L-Table of 0.161 with normal information.
   b. Homogeneity Test of Variance
      Results of variance homogeneity test on variable arm muscle strength (X1) has a standard deviation of 1.20 and a variance of 1.44. Next on the variable strength of the back muscles (X2) has a standard deviation of 1.07 and a variance of 1.14. Furthermore, the upper passing skill variable (Y) has a standard deviation of 0.86 and a variance of 0.74.
   3. Test Research Hypothesis
      a. Test the Hypothetical Relationship Between Arm Muscle Strength and Upper Service Skills (X1 to Y).
         The initial hypothesis in this study is that there is a strong contribution between hand muscle strength and volleyball serve skills. The results of data analysis show that the number is greater than rtabel = 0.65 and rtabel = 0.361. There is a strong relationship between hand muscle strength and volleyball service skills. Because the ratio of K = r2 x 100% = (0.65) 2 x 100% = 42%, the contribution of arm muscle strength to volleyball's top serve skills is 42%.
      b. Test the Hypothetical Relationship Between Back Muscle Strength and Upper Service Skills (X2 with Y).
         The second hypothesis in this study is that there is a significant contribution between back muscle strength and volleyball top serve skills. The results of data analysis show that r-count is greater than r-table, namely r-count = 0.83 and r-table = 0.361. The contribution between back muscle strength and volleyball's top serve skills is significant. So assuming that K = (0.83) 2 x 100% = 69%, we can calculate that the contribution of back muscle strength to volleyball's top serve skills is 69%.
      c. Test the Hypothesis of the Relationship Between Arm Muscle Strength and Back Muscle Strength Simultaneously on Upper Service Skills (X1 and X2 with Y).
         The third hypothesis in this study is that in volleyball games played by extracurricular students in semester 1 of Physical Education at Bengkulu University, there is a significant contribution between arm muscle strength (X1), back muscle strength (X2), and volleyball service skills. This third hypothesis was tested with a double correlation. According to data analysis, Ho was rejected and Ha was accepted because r-count = 0.82 is greater than r-table = 0.361. That is, there is a significant contribution between X1 and volleyball, which is K = r2 x 100% = 0.82 x 100% = 67%. Thus, the contribution of arm and back strength to volleyball serve skills is 67%. Based on the above hypothesis, it can be concluded that there is a significant contribution between the independent and dependent variables.

B. Discussion
   1. Relationships Between Variables
      a. The Relationship of Arm Muscle Strength to Volleyball's Top Service Skills.
         Based on the results of analysis and hypothesis testing, the hypothesis is accepted as true. Volleyball's top serve skills are positively correlated with arm muscle strength. Arm muscle strength is positively correlated with upper service ability. Especially required by a feeder, arm muscle strength is a local muscle to receive maximum load. To produce the ball rate, arm muscle strength is required. As explained by (Prasetyo, 2015) that upper service technique in the discharge phase. The ball is taken at head level. The arms almost didn't move. Before throwing the ball, the bat's arm or player is pulled back in a straight or bent position. This arm muscle is very important for volleyball students, including those who perform top serves.
         Strength affects physical activity and plays an important role in protecting athletes from injury. This allows athletes to run faster, throw farther, lift weight, pull, push, hit, kick, etc. (Supriyanto & Martiani, 2019). Therefore, a feeder must have good physical condition to produce a good ball rate. One of these physical conditions is the strength of the arm muscles.
      b. The Relationship of Back Muscle Strength to Volleyball's Top Service Skills.
         Based on the results of analysis and hypothesis testing, the hypothesis is accepted as true. Back muscle strength is positively correlated with service ability over volleyball play. Therefore, a feeder must have good back
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muscle strength to produce a high ball rate. In accordance with the conclusions of James A. Baley's material in (Gazali, 2016) explained that it takes flexion of the shoulder and spine to produce twisting, hyperextension, flexion, and lateral movements to give a beat to the blow. The stronger the bend of that part of the body, the further back they can pull the hand, which means more moments are available for the arm when making a blow. Therefore, a feeder must have the strength of the back muscles to be able to hold and launch the ball as it moves in order to produce a good ball rate.

Favorable physical conditions must exist on the server. The muscle strength of his fingers is one such physical condition. Strength is the ability of muscles to increase their tension when faced with obstacles. Therefore, resistance training, now known as strength training, is an ideal type of exercise to increase muscle strength (Oddie Barnanda Rizky et al., 2024).

c. The Relationship of Arm Muscle Strength and Back Muscle Strength to Volleyball's Top Service Skills.

Based on the results of hypothesis analysis and testing, all three proposed hypotheses are recognized as valid. There is a significant correlation between arm and back muscle strength and upper serve ability in the game of volleyball. In other words, the stronger the arm and back muscles, the better the upper serve skills. In freestyle swimming, the strength of the back muscles is very important, especially in a horizontal body position. A good pace can be achieved if the dorsal part of the body can maintain its proper position and arm muscle strength and can be used to support it (Shanty et al., 2021). Every student who plays volleyball needs a physical condition that allows them to serve on volleyball, namely the strength of the arm and back muscles. According to the findings of previous studies.

(Hasanuddin, 2019) Summing up the results of the study To have strong arm muscles, special and continuous training is needed along with the study of mechanics to make the right type of exercise. To improve upper serve skills, athletes must improve arm and back muscle strength through an appropriate mechanical assessment.

2. Contribution Between Variables

The results of testing the hypothesis between arm muscle strength (X1) and volleyball service ability (Y) showed that the contribution of arm muscle strength to volleyball top serve skills was 42%.


The results of testing the second hypothesis between back strength (X2) and volleyball's top serve skills (Y) showed that the contribution of back muscle strength was 69%.


The results of testing the hypothesis of the three variables regarding arm muscle strength (X1) and back muscle strength (X2) to volleyball top serve skills (Y) showed that the contribution of each arm and back muscle strength was 67%.

CONCLUSION

Based on the results of research conducted on sports students in the first semester of Bungkulu University using data normality tests, homogeneity tests, hypothesis tests, and multiple correlation tests, conclusions can be drawn, namely:

1. The ratio of arm muscle strength (X1) to volleyball's top serve skills is 42%.
2. The contribution of back strength (X2) to volleyball's top serve skills is 69%.
3. There is a significant contribution between arm muscle strength and back muscle strength which reaches 67% of volleyball service skills in Semester 1 Physical Education Students of Bungkulu University.

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