COMPETITOR:
JURNAL PENDIDIKAN KEPELATIHAN OLAHRAGA
e-ISSN: 2657-0734 & p-ISSN: 2085-5389 || Volume 17, Number 3, 2025 || P.2903-2909

The Relationship Between Arm Muscle Strength And Arm Length To The Accuracy Of Overall Services In Extracurricular Volleyball Students At State Vocational High School 4 Palembang

Armansa[1A-E*], Iyakrus[2B-D], Destriana[3B-D]

[1,2,3] Universitas Sriwijaya, Sumatera Selatan, Indonesia

armansa805 @gmail.com[1*], iyakrus @fkip.unsri.ac.id[2], iyakrus @fkip.unsri.ac.id[3]

ABSTRACT

This study aims to analyze the relationship between arm muscle strength and arm length on the accuracy of the upper serve in extracurricular volleyball students at SMK Negeri 4 Palembang. The research method used is correlational. The research sample was 36 students (20 boys and 16 girls) selected using the total sampling technique. The instruments used included an arm muscle strength test through push-ups, arm length measurements using a measuring tape, and an upper serve accuracy test. The results showed that there was a perfect relationship between arm muscle strength and the accuracy of the upper serve, with a correlation value of R = 0.946 in male students and R = 0.933 in female students. Arm length also had a moderate relationship to the accuracy of the upper serve, with a correlation value of R = 0.613 in male students and R = 0.589 in female students. Regression analysis showed that arm muscle strength and arm length together contributed perfectly to the accuracy of the upper serve, with a value of R = 0.946 in male students and R = 0.940 in female students. These results indicate that arm muscle strength and arm length are important factors in improving the accuracy of the upper serve. These findings provide implications for coaches to develop physical training programs that focus more on strengthening students' arm muscles and overhead serve techniques.

ARTICLE HISTORY
Received: 2025/08/07
Accepted: 2025/10/28
Published: 2025/10/31

KEYWORDS
Strength;
Arm Muscle;
Arm Length;
Overall Services
Volleyball.

AUTHORS' CONTRIBUTION
A. Conception and design of the study;
B. Acquisition of data;
C. Analysis and interpretation of data;
D. Manuscript preparation;
E. Obtaining funding

Cites this Article : Armansa, Armansa; Iyakrus, Iyakrus; Destriana, Destriana. (2025). The Relationship Between Arm Muscle Strength And Arm Length To The Accuracy Of Overall Services In Extracurricular Volleyball Students At State Vocational High School 4 Palembang. **Competitor: Jurnal Pendidikan Kepelatihan Olahraga**. 17 (3), p.2903-2909

INTRODUCTION

Physical education is a complex matter, so it will make up the components of the abilities of every normal human being. Because not all humans have these abilities completely without any drawbacks (Destriana et al., 2022). Exercise is one of a person's needs that must be considered in their daily lives in order to maintain health, because exercise plays an important role in shaping the spiritual and physical soul so that it can form good character and nature (Silvi Aryanti & Iyakrus, 2017). Physical education prioritizes physical activities that play a role in development. Individual development and

Armansa[1A-E*], Iyakrus[2B-D], Destriana[3B-D]
armansa805 @gmail.com[1*]

development in supporting harmonious, balanced, and holistic physical, social, mental, and emotional growth and development. Physical education is education that involves physical activities to gain physical abilities and skills. Physical education is related to affective, cognitive, and psychomotor which are human provisions to achieve life goals, Hanief in Destriana et al (2020). In physical activities, many study branches of sports games, one of which is volleyball.

Volleyball is a game that is widely loved by the public and has become a global sport. This is because it is widely played in competitions. It turns out that volleyball is a combination of several other large ball games: basketball, baseball, and handball. (Dwi Yulia NM & Endang Pratiwi, 2020) . The various techniques that players must master in volleyball are: (1) service, (2) passing, (3) set-up, (4) smash (spike), and (5) block. Divided into 3-2 rounds. The team that gets a score of 25 first will be declared the winner in that round. The winner of the match is the team that wins two rounds (Kuncoro, 2021). Volleyball is also a sport that has complex movement elements. This complexity can be shown by the involvement of several elements, namely mastery of skills, including mastery of technical, physical, tactical, and mental skills (Padila et al., 2023).

Of the various basic techniques in volleyball, this study will focus on basic service skills. Technically, there are several types of serves in volleyball, including the underhand serve and the overhand serve. The underhand serve is considered an easy technique to perform, making it the most frequently used by beginners or learning groups. The overhand serve is considered a more difficult technique. The primary objective of the overhand serve is to accelerate the ball into the opponent's court. The overhand serve can be executed with the ball above the head and requires greater force. The overhand serve is arguably the most difficult serve to perform compared to the underhand serve. Because the overhand serve is significantly more difficult than the underhand serve, this study will focus on the basic techniques of the overhand serve.

Based on October, when the researcher was conducting (PLP introduction to the school field at SMK Negeri 4 Palembang, students were playing volleyball. The researcher saw that there were still many students who could not do the basic technique of upper serve well, so that students could only do the lower serve in volleyball. To achieve satisfactory performance requires very long training and should not be done directly to be able to Becoming a great player requires a process starting from training time, type of training, honing one's abilities, and participating in various match groups within a certain time (Ijacrus 2019). This inability not only results in lost points but can also reduce students' confidence in matches. Likewise, students who struggle with the additional challenge of crossing the ball into the opponent's area face additional challenges. This physical challenge adds complexity for those who struggle with basic techniques.

METHODS

The research used in this study is a quantitative method, which aims to examine the relationship between independent and dependent variables. This study uses a

Armansa[1A-E*], Iyakrus[2B-D], Destriana[3B-D]
armansa805 @gmail.com[1*]

correlational design. This study aims to determine the degree of relationship between two or more variables without making changes, additions, or manipulations to existing data. Correlation is one or more quantitative data analysis techniques; two or more variables are said to be correlated if changes in one variable are followed by changes in the other variable regularly in the same direction (M Teguh Saefuddin, et al., 2023). The independent variables in this study are arm muscle strength (X1), arm length (X2), while the dependent variable is the accuracy of volleyball service (Y) of extracurricular students at SMK Negeri 4 Palembang.

RESULTS AND DISCUSSION

In this study, the population taken was students who participated in volleyball extracurricular activities at SMK Negeri 4 Palembang, with a total of 20 male students and 16 female students. This study was conducted on October 21-25, 2024, with a research duration of 1 week, on the first and second days of instrument test preparation on the third and fourth days of data collection. In the arm muscle strength test, Students performed *push-ups* for 1 minute. After completing the *push-up test*, their arm length was measured using a measuring tape. After measuring their arm length, students were given an overhead serve test, performing the overhead serve movement 10 times, and then the average score was taken for the accuracy of the overhead serve test.

Table 1
Arm Muscle Strength and Accuracy Top Service Man

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	743,104	1	743,104	154,285	<,001 [b]
Residual	86,696	18	4,816		
Total	829,800	19			

The results obtained from *the SPSS* 26 calculation showed a significant value of 0.001, indicating a value greater than α = 0.05, which means there is a relationship between arm muscle strength (x^1) and the accuracy of the student's service (y). Then the value of the coefficient of determination R is matched with the guidelines for the degree of relationship.

Table 2
Results of regression tests on arm muscle strength and the accuracy of men's uppercut service

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate
1	.946 [a]	.896	.890	2195

Judging from the regression test, it shows that the coefficient of determination R = 0.946, which means that arm muscle strength (X^1) has a perfect correlation with the accuracy of the upper serve (Y). So, the conclusion is that arm muscle strength (X^1) has a significant relationship with the accuracy of the upper serve (Y).

Table 3
Arm Muscle Strength and Accuracy: Top Service for Women

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1,482,685	1	1,482,685	94,755	<,001 [b]
Residual	1,482,685	14	15,648		
Total	**1,482,685**	**15**			

Armansa[1A-E*], Iyakrus[2B-D], Destriana[3B-D]
armansa805 @gmail.com[1*]

The results obtained from *the SPSS* 26 calculation showed a significant value of 0.001, indicating a value smaller than α = 0.05, which means there is a relationship between arm muscle strength (x^1) and the accuracy of the student's service (y).

Table 4.

Results of regression tests on arm muscle strength and the accuracy of women's uppercut service

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate
1	.613 [a]	.082	.031	6,507

Judging from the regression test, it shows that the coefficient of determination R = 0.933, which means that arm muscle strength (X^1) has a perfect correlation with the results of the upper service accuracy (Y). So the conclusion is that arm muscle strength (X^1) has a significant relationship with the upper service accuracy (Y), which has a perfect correlation.

Table 5.

Arm length in relation to the results of service accuracy for male students

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	67,716	1	67,716	1,599	<.004 [b]
Residual	762,084	18	42,338		
Total	**829,800**	**19**			

The results obtained from *the SPSS* 26 calculation showed a significant value of 0.004, indicating a value greater than α = 0.05, which means there is a relationship between arm muscle strength (x^2) and the accuracy of the student's service (y).

Table 6.

Results of the regression test on arm length and the accuracy of men's uppercut service

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate
1	.933 [a]	.871	.862	3,956

Judging from the regression test, it shows that the coefficient of determination R = 0.613, which means that arm length (X^2) has a strong correlation with the accuracy of the upper serve (Y). So the conclusion is that arm length (X^2) has a significant relationship with the accuracy of the upper serve (Y) which has a perfect correlation.

Table 7

The length of the arm on a result of the accuracy of the service for female students

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	155,902	1	155,902	1,511	<.002 [b]
Residual	1,444,098	14	103,150		
Total	**1,600,000**	**15**			

The results obtained from *the SPSS* 26 calculation showed a significant value of 0.002, indicating a value smaller than α = 0.05, which means there is a relationship between arm length (x^2) and the accuracy of the student's service (y).

Table 8

Results of the regression test on arm length and accuracy of service for female students

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate
1	.589 [a]	.058	.010	10,702

Judging from the regression test, it shows that the coefficient of determination R = 0.589, which means that arm length (X^2) has a very strong correlation with the results of

Armansa[1A-E*], Iyakrus[2B-D], Destriana[3B-D]
armansa805 @gmail.com[1*]

the upper service accuracy (Y). So the conclusion is that arm length (X^2) has a significant relationship with the accuracy of the upper service (Y), which has a perfect correlation according to the guidelines for the degree of relationship.

Table 9

The contribution of arm muscle strength and arm length to the results of men's service accuracy

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	743,108	2	371,554	72,861	<,001 [b]
Residual	86,692	17	5,100		
Total	**829,800**	**19**			

The results obtained from *the SPSS* 26 calculation showed a significant value of 0.001, indicating a value smaller than α = 0.05, which means there is a relationship between arm muscle strength (x^1) and the accuracy of the student's service (x^2). Then the value of the coefficient of determination R is matched with the guidelines for the degree of relationship.

Table 10

Results of the regression test on arm muscle strength and arm length on service accuracy for male students

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate
1	.946 [a]	.896	.883	2,258

Judging from the regression test, it shows that the coefficient of determination R = 0.946, which means that arm muscle strength (X^1) and arm length (X^2) have a strong correlation with the accuracy of the upper serve (Y). So the conclusion is that arm muscle strength and arm length (X^2) have a significant relationship with the accuracy of the upper serve (Y) which has a strong correlation.

Table 11.

The contribution of arm muscle strength and arm length to the accuracy of women's service

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	67,716	1	67,716	1,599	<.004 [b]
Residual	762,084	18	42,338		
Total	**829,800**	**19**			

The results obtained from *the SPSS* 26 calculation showed a significant value of 0.001, indicating a value smaller than α = 0.05, which means there is a relationship between arm muscle strength (x^1) and the accuracy of the student's service (x^2).

Table 12.

Results of the regression test on arm muscle strength and arm length on the accuracy of service for female students

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate
1	.940 [a]	.883	.865	3,914

Judging from the regression test, it shows that the coefficient of determination R = 0.940, which means that arm muscle strength (X^1) and arm length (X^2) have a strong correlation with the results of the accuracy of the upper serve (Y). So the conclusion is that arm muscle strength (X^1) and arm length (X^2) have a significant relationship with the accuracy of the upper serve (Y) which has a perfect correlation.

Armansa[1A-E*], Iyakrus[2B-D], Destriana[3B-D]
armansa805 @gmail.com[1*]

CONCLUSION

Based on the results of the research conducted by researchers at SMK Negeri 4 Palembang, which have been processed and analyzed, the researchers can conclude the results of the study on the relationship between arm muscle strength and arm length to the accuracy of overhead functions in extracurricular volleyball games at SMK Negeri 4 Palembang. The following conclusions can be drawn:

Arm muscle strength: Has a perfect relationship with the accuracy of the upper serve for both men (significant value 0.001) and women (significant value 0.001). Coefficient of determination: Men: R = 0.946, indicating a perfect correlation. Women: R = 0.933, indicating a perfect correlation. 2. Arm length: Has a moderate relationship with the accuracy of the upper serve for both men (significant value 0.004) and women (significant value 0.002). Coefficient of determination: Men: R = 0.613, indicating a moderate correlation. Women: R = 0.589, indicating a moderate correlation. Arm muscle strength and arm length: Together have a perfect relationship with the accuracy of the upper serve for both men (significant value 0.001) and women (significant value 0.001). Coefficient of determination: Men: R = 0.946, indicating a perfect correlation. Women: R = 0.940, indicating a perfect correlation.

Arm muscle strength plays a crucial role in improving the accuracy of the volleyball overhand serve in both male and female players. Arm length also contributes to overhand serve accuracy, although with a moderate correlation. The combination of arm muscle strength and arm length significantly impacts overhand serve accuracy.

ACKNOWLEDGMENT

The author would like to thank all research subjects, especially SMK Negeri 4 Palembang, who actively participated and provided valuable opportunities. To the researchers. The support and cooperation provided by the school, including teachers, staff, and students, were crucial to the smooth implementation of this research. Without the enthusiastic participation and contribution of all parties, this research would not have been possible.

REFERENCES

Apriyansyah, MF, Iyakrus, & Bayu, WI (2022). Journal of Physical Education. Development of the "Mini Painting" Badminton Game Model in Physical Education Learning at Junior High School M., 16 (3), 730–741.

Destriana, & Destriani, HY (2020). Menssana Journal. Menssana Journal , 5 No. 2 , 146–156. https://doi.org/10.24036/MensSana.06022021.28

Destriana, D., Elrosa, D., & Syamsuramel, S. (2022). Physical Fitness and Student Learning Outcomes. Jambura Health and Sport Journal, 4 (2), 69–77. https://doi.org/10.37311/jhsj.v4i2.14490

Dwi Yulia NM & Endang Pratiwi. (2020). Volleyball Learning. In volleyball learning (Vol. 3).

Iyakrus, Subandi, SS & WIB (2022). Evaluation of the Badminton Development Program in Banyuasin Regency. Journal of Recreational Health Education, 8 (2), 247–256. https://ojs.mahadewa.ac.id/index.php/jpkr/article/view/1473

Kuncoro, AD (2021). The Relationship Between Arm Muscle Strength and Arm Length with Volleyball Overhead Serve Results. Porkes Journal, 4 (2), 118–125. https://doi.org/10.29408/porkes.v4i2.4661

M Teguh Saefuddin1, Tia Norma Wulan2, S. and DEJ, & 1, 2, 3, 4Sultan Ageung Tirtayasa University. (2023). Correlational Research. Quantitative and Qualitative Data Collection Techniques in Research Methods, 2 (6), 784–808.

Padila, O. J., Jasmani, P., Faculty, K., & Dan, K. (2023). The Effect of Jump Rope Training on Volleyball Smash Ability Results at the Banyuasin Young Patriot Club. Repository.Unsri. Ac.Id. https://repository.unsri.ac.id/96158/3/RAMA_85201_06061281924014_0012086205_01_front_ref.pdf

Silvi Aryanti, Iyakrus, AP (2017). Bench Dip Training On Smash Accuracy In Volleyball Athletes. 102, 286–290. http://dx.doi.org/10.31851/hon.v6i2.10833

Zeri, M., Iyakrus, I., & Bayu, WI (2023). The Effect of Hurdle Training on Jump Height in Male Volleyball Players of the Raja Wali Club, Musi Rawas Regency. Corner: Journal..., 4, 1–6. https://doi.org/10.36379/corner.v4i1.441