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Relationship Between Arm Muscle Strength And Volleyball Overhead Service Accuracy In Athletes PBV Hizbul Wathan

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ABSTRACT

This study aims to determine the relationship between upper arm muscle strength and the accuracy of volleyball upper serve in PBV Hizbul Wathan athletes. The method used is a quantitative method with a correlational approach. The subjects in this study were 15 PBV Hizbul Wathan athletes selected through a purposive sampling technique. The instruments used in the study included a push-up test to measure upper arm muscle strength and a service accuracy test to measure the accuracy of the upper serve. The results showed that the upper arm muscle strength of athletes was in the good to very good category, with an average of 24.93 push-ups, while the accuracy of the upper serve also showed high results with an average value of 29.40. Based on the Pearson correlation test, a correlation value of r = 0.839 was obtained with a significance value of p = 0.000, which indicates that there is a very strong and significant relationship between upper arm muscle strength and upper serve accuracy. It can be concluded that the greater the upper arm muscle strength an athlete has, the higher the level of upper serve accuracy that can be achieved. These findings indicate the importance of strengthening arm muscles in supporting the performance of overhead service techniques and provide implications for coaches in designing targeted physical training programs.

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B. Acquisition of data;
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INTRODUCTION

Sports play a vital role in human life, not only supporting physical and mental health but also contributing to character development and improved quality of life (Setiyawan, 2017). One of the most popular and rapidly growing sports in Indonesian society is volleyball. Volleyball is widely played in schools, offices, and community settings, serving both recreational and competitive purposes (Pahrian et al., 2017).

Volleyball is a team sport played between two teams of six players, aiming to ground the ball on the opponent's court by sending it over the net within the rules of the game

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(Darumoyo et al., 2024) To achieve optimal performance, mastering basic techniques is essential, including service, passing, smashing, and blocking (Keswando et al., 2022). Among these, the overhead serve plays a critical role as it initiates the game and can directly score points while pressuring the opponent (Gazali, 2016).

The ability to execute a powerful and accurate overhead serve is influenced by various factors, including upper arm muscle strength. Strong arm muscles contribute significantly to generating forceful and well-directed serves, thereby affecting both the accuracy and effectiveness of the technique (Dwi, 2021). Furthermore, hand-eye coordination and the overall physical condition of the athlete support successful performance in overhead serving (Akbar & Al Ghani, 2024).

PBV Hizbul Wathan, a volleyball club located in Burneh District, Bangkalan Regency, has actively participated in regional competitions since its establishment in 2000. Despite its long history, the athletes' performance in executing basic techniques, particularly the overhead serve, varies significantly. This necessitates a focused study to examine the factors that influence the accuracy of the overhead serve in athletes from PBV Hizbul Wathan.

Previous research has indicated a significant relationship between upper arm muscle strength and overhead serve performance. For instance, a study by M. Nusri Rachman found a notable correlation, reporting a relationship percentage of 38.31%. However, similar research has not been conducted specifically within PBV Hizbul Wathan, and existing studies have typically used limited testing instruments.

Given this background, the current study aims to analyze the relationship between upper arm muscle strength and the accuracy of the overhead volleyball serve among athletes of PBV Hizbul Wathan. It is expected that the findings will contribute to the scientific development of more effective and targeted training methods to improve athlete performance, particularly in the area of fundamental overhead serving techniques.

METHODS

This study used a quantitative correlational approach to examine the relationship between upper arm muscle strength and overhead serve accuracy in volleyball. When changes in one variable are followed by changes in the other variable in a regular manner, the variables are considered to be correlated with a positive or negative correlation pattern (El Hasbi et al., 2023).

Research instruments are tools for collecting, examining, and investigating research topics (Nasution, 2016). The research was conducted at PBV Hizbul Wathan Club in Bangkalan, with 15 male athletes selected through purposive sampling based on their active participation in training and competitions.

Data were collected using two tests: the push-up test to measure upper arm strength, and an overhead serve accuracy test, where each participant performed 10 serves toward a target area. Each successful serve earned one point. Tests were conducted under standardized conditions in a single session.

All data were analyzed using SPSS version 16.0. Descriptive statistics were calculated, and the Kolmogorov–Smirnov test was used to assess normality. Since the data were normally distributed, Pearson's correlation coefficient was used to test the relationship between the two variables at a 0.05 significance level.

RESULTS AND DISCUSSION

Result

The analysis of this study involved 15 volleyball athletes from PBV Hizbul Wathan. The push-up test results showed that 40% of participants were in the "very good" category, 40% in the "good" category, and 20% in the "sufficient" category. The overall average push-up score was 24.93 repetitions, with a standard deviation of 6.088.

Push-Up Test Result

Table 1.
Push-Up Test Results (Upper Arm Strength Classification)

Description	Frequency	Percent
Perfect	0	0%
Excellent	6	40%
Good	6	40%
Fair	3	20%
Less	0	0%
Total	**15**	**100%**

The accuracy of overhead serves was also classified based on performance levels. 73% of participants were categorized as "perfect," and 27% as "very good," with an average score of 29.40 out of 33 and a standard deviation of 3.542.

Table 2.
Overhead Serve Accuracy Classification

Description	Frequency	Percent
Perfect	11	73%
Excellent	4	27%
Good	0	0%
Fair	0	0%
Less	0	0%
Total	**15**	**100%**

Furthermore, it will be tested for normality using the Kolmogorov-Smirnov method to determine whether the data is normally distributed.

Table 3
Hasil Uji Normalitas Kolmogorov-Smirnov Test Push Up

		PUSH_UP
N		15
Normal Parameters[b]	Mean	24.93
	Std. Deviation	6.088
Most Extreme Differences	Absolute	.148
	Positive	.096
	Negative	-.148
Test Statistic		.148
Asymp. Sig. (2-tailed)		.200[c,d]

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Based on the test results of Table 3, the significance value for both variables is greater than 0.05, so it can be concluded that the data is normally distributed.

Table 4

Kolmogorov-Smirnov Test Normality Test Results Serving

		SERVIS_A
N		15
Normal Parameters[a,b]	Mean	29.40
	Std. Deviation	3.542
Most Extreme Differences	Absolute	.169
	Positive	.155
	Negative	-.169
Test Statistic		.169
Asymp. Sig. (2-tailed)		.200[c,d]

Based on the test results of Table 4, the significance value for both variables is greater than 0.05, so it can be concluded that the data is normally distributed.

Based on the test results, the significance value for both variables is greater than 0.05, so it can be concluded that the data is normally distributed and can be analyzed using parametric tests such as Pearson correlation. To determine the relationship between upper arm muscle strength (variable X) and the accuracy of the upper serve (variable Y), a correlation test was conducted using the Pearson Product Moment technique. The following are the results of the analysis obtained:

Table 1

Pearson Correlation Test Results

		X	Y
X (Push Up)	Pearson Correlation	1	.839**
	Sig. (2-tailed)		.000
	N	15	15
Y (Servis)	Pearson Correlation	.839**	1
	Sig. (2-tailed)	.000	
	N	15	15

**. Correlation is significant at the 0.01 level (2-tailed).

The value of r = 0.839 indicates that there is a very strong and positive relationship between upper arm muscle strength and the accuracy of the upper serve. The significance value of p = 0.000 < 0.05 indicates that the relationship is statistically significant at the 5 % significance level. This means that the greater the upper arm muscle strength of an athlete (the more push-ups they are able to do), the higher the likelihood of the athlete having good accuracy of the upper serve. This result strengthens the research hypothesis that upper arm muscle strength plays an important role in the implementation of accurate upper serve techniques in volleyball games.

Discussion

The findings demonstrate a strong positive relationship between upper arm muscle strength and overhead serve accuracy in volleyball. This supports the hypothesis that athletes with higher upper arm strength tend to deliver more accurate serves. The result aligns with previous studies, such as (Dwi, 2021), which confirmed the role of upper body

strength in enhancing volleyball performance, particularly in serving.

The strength of these muscles is very important in producing a strong, directed, and stable push against the ball. Athletes with good arm muscle strength tend to be able to control the direction and power of their strokes more effectively, thereby increasing the accuracy of the serve.

Physiologically, the upper serve technique requires explosive movements dominated by the activity of the arm muscles such as the deltoid, biceps, and triceps. In volleyball, arm muscle strength is very important for performing various game techniques, including serving, spikes, passing, and digging (Karmila et al., 2024).

Biomechanically, the overhead serve involves rapid and forceful arm movements that rely heavily on the deltoids, biceps, and triceps. Stronger muscles in these areas improve the ability to generate explosive yet controlled movements, contributing to better targeting during the serve. Observations during testing showed that athletes with higher push-up scores consistently achieved higher serve accuracy, further validating the statistical relationship.

However, it is important to consider that service performance is multifactorial. In addition to muscular strength, elements such as hand-eye coordination, concentration, and technical consistency likely influence accuracy. Thus, while upper arm strength is a critical factor, it should be developed alongside other performance components.

The results provide practical implications for coaches and trainers. Emphasizing upper arm strength in training programs through exercises like push-ups, resistance band work, or weightlifting can support improvements in serve precision. Structured strength training can thus enhance both physical and technical aspects of volleyball performance.

CONCLUSION

This study found a very strong and statistically significant positive correlation between upper arm muscle strength and the accuracy of overhead serves among volleyball athletes at PBV Hizbul Wathan. The results indicated that athletes with higher push-up scores, reflecting greater arm strength, tended to achieve higher accuracy scores in overhead serving. The Pearson correlation coefficient of $r = 0.839$ and a p-value of 0.000 confirmed this strong association.

These findings highlight the critical role of upper arm strength in enhancing the technical performance of overhead serves. Therefore, targeted training programs that focus on strengthening the arm muscles such as push-up routines and resistance exercises are strongly recommended to improve serve precision and overall volleyball performance.

REFERENCES

Akbar, A., & Al Ghani, M. (2024). Analisis Tingkat Keterampilan Servis Atas Bola Voli pada Siswa SMP Negeri 3 Tangerang Selatan. *Jurnal UMJ*.

Darumoyo, K., Nugroho, G. S., & Wahyudi, A. N. (2024). Hubungan kekuatan otot lengan terhadap ketepatan servis atas. *Jurnal Porkes*, *7*(1), 84–95. https://doi.org/10.29408/porkes.v7i1.22774

Dwi, K. A. (2021). Hubungan Kekuatan Otot Lengan Dan Panjang Lengan Dengan Hasil Servis Atas Bola Voli. *Creating Productive and Upcoming Sports Education Profesional Hmzanwadi University*, *4*(2), 118–125.

El Hasbi, A. Z., Damayanti, R., Hermina, D., & Mizani, H. (2023). PENELITIAN KORELASIONAL (Metodologi Penelitian Pendidikan). *Jurnal Agama, Sosial, Dan Budaya*, *2*(6). https://publisherqu.com/index.php/Al-Furqan

Gazali, N. (2016). Kontribusi Kekuatan Otot Lengan Tehadap Kemampuan Servis Atas Atlet Bolavoli. In *Journal of Physical Education* (Vol. 3, Issue 1). Health and Sport. http://journal.unnes.ac.id/nju/index.php/jpehs

Karmila, M., As, H., Mappaompo, M. A., Hudain, M. A., & B, B. (2024). Kontribusi Kekuatan Otot Lengan, Koordinasi Mata Tangan Dan Kekuatan Otot Perut Pada Kemampuan Servis Atas Bolavoli Pada Siswa UPT SPF SMP Negeri 29 Bulukumba. *Journal on Education*, *06*(03), 17574–17580.

Keswando, Y., Septi Sistiasih, V., & Marsudiyanto, T. (2022). Survei Keterampilan Teknik Dasar Atlet Bola Voli. *Porkes Jurnal Pendidikan Olahraga Kesehatan*, *5*(1), 168–177. https://doi.org/10.29408/porkes.v5i1

Nasution, H. F. (2016). Instrumen Penelitian Dan Urgensinya Dalam Penelitian Kuantitatif. *Jurnal Ilmu Ekonomi Dan Keislaman*, 59–75.

Pahrian, A., Ratu, B., & Esser, N. L. (2017). Hubungan Kekuatan Otot Lengan Terhadap Ketepatan Servis Atas Dalam Permainan Bola Voli. *Jurnal Pendidikan Olahraga Dan Kesehatan Ikip Mataram*, *4*(2).

Setiyawan. (2017). Visi Pendidikan Jasmani dan Olahraga. In *Setiyawan) Jurnal Ilmiah PENJAS* (Vol. 3, Issue 1).