

# faisal

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**THE RELATIONSHIP OF UPPER ARM MUSCLE STRENGTH AND  
EYE-HAND COORDINATION WITH THE EFFECTIVENESS OF  
THE BOTTOM SERVICE**

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**Abstract**

Sport is defined as a form of planned, gradual and continuous sports activity to improve the athlete's ability through competition. Sport does not pay attention to race, religion or ethnicity, because sport can unite people and help them become better. Volleyball is one of the sports that is quite popular in Indonesia. Volleyball has the advantage that playing it does not require a lot of money, so it becomes a special attraction especially at SDN Sondakan by holding a volleyball tournament. In participating in the volleyball tournament, SDN Sondakan has never won, so in extracurricular activities it is necessary to improve the achievements and training of its students. An athlete must be in good physical condition in order to play volleyball well. Eye and hand coordination needs to be done to improve the use of the hands when serving. Arm muscle strength also affects an athlete's ability to serve underhand. This research aims to determine the relationship between upper arm muscle strength and eye-hand coordination with the effectiveness of the bottom serve in volleyball at SDN Sondakan in 2024. The research method used is a quantitative research method with correlational tests. The population in this study were extracurricular boys' volleyball students at SDN Sondakan. The sample taken from the total sampling results was 10 students. Data collection techniques use tests and measurements. The background of the problem in this research is: 1) It is not yet known whether there is a relationship between upper arm muscle strength and the effectiveness of volleyball underhand service. 2) It is not yet known whether there is a relationship between eye-hand coordination and the effectiveness of volleyball underhand serves. 3) It is not yet known whether there is a relationship between upper arm muscle strength and eye-hand coordination with the effectiveness of volleyball underhand serves. The aim of this research is: 1) Knowing the relationship between arm muscle strength and the effectiveness of volleyball underhand serve. 2) Knowing the relationship between eye-hand coordination and the effectiveness of volleyball underhand service. 3) Knowing the relationship between eye-hand coordination and the effectiveness of volleyball underhand service. The data analysis technique used is statistical analysis through correlation studies. The research results obtained, 1) There is a relationship between upper arm muscle strength and the effectiveness of the lower serve in men's volleyball at SDN Sondakan, with a value of  $r_{count} = 0.849 > r_{table} = 0.631$ ; 2) there is a significant relationship between hand-eye coordination and the effectiveness of the bottom serve with a value of  $r_{count} = 0.641 > r_{table} = 0.631$ ; 3) there is a relationship between arm muscle strength and eye-hand coordination with the effectiveness of the bottom serve with a value of  $r_{count} = 0.804 > r_{table} = 0.631$ . The conclusion is that upper arm muscle strength and hand-eye coordination are significantly related to the effectiveness of the volleyball bottom serve.

**Keywords:** Upper Arm Muscle Strength and Eye-Hand Coordination, Lower Service Ability

**INTRODUCTION**

Sport is a physical activity carried out for those who gain fitness to maintain physical and spiritual health. For the majority of people, they do sports activities as a means of recreation, there are some who do sports with the aim of achieving an achievement. (Vera Septi Sistiasih & Shofyan Reza Pradana, 2022). The aim of playing volleyball is to pass the ball over the net so that it can fall to the floor of the

opponent's court and to prevent a similar attempt from the opponent. Each team can play three bounces to return the ball. The ball is declared in play after the ball is hit by the server over the net into the opponent's area (Jariono, 2022). Volleyball is a sport that is popular with all levels of society in Indonesia. This sport can be played from children to adults (Jariono et al., 2021). In Sondakan Elementary School extracurricular activities, 10 male students participated in a volleyball match. The principal of Sondakan Elementary School, Siti Samsiyah, S.Pd., M.Pd, explained that inter-elementary school volleyball tournaments are held every year throughout Sukoharjo Regency. From 2019 to 2023, the SDN Sondakan volleyball team has never won the tournament. As a result, to achieve achievements in the following year, coaching is needed.

According to (Sovens, 2018) that coordination is the ability to complete motor tasks quickly and purposefully which is determined by the process of controlling and regulating movements as well as the cooperation of the central nervous system. (Irfan, 2016) explains that included in the ability of coordinated movement is eye-hand coordination which is related to the ability to select an object and coordinate it (the object is seen with regulated movements). An example is in the game of table tennis. Eye-hand coordination activities require precise observation and regulation of movement.

The volleyball bottom serve is directing all the energy you have, especially the arms, which must be coordinated with arm movements to support the ability to play the ball by trying to bounce the ball using the arms as much as possible by coordinating the ability to see and hit the ball so that you can determine and direct the ball to be served (Handayani, 2018). According to (Subakti & Iksan, 2018), Strength is essential to sports performance and determines a person's fitness level. Strength is the ability of a muscle or group of muscles to overcome resistance or load during exercise. This refers to a person's ability to maximize eye-arm coordination when executing a top serve in a very short time, especially in volleyball. When throwing a punch, good eye-hand coordination increases the use of force. In other words, perform top serves with greater force in proportion to the number of top serves they perform in a volleyball game.

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The success of a top serve in a volleyball game is very dependent on good coordination, in addition to sufficient muscle strength. According to (Ertanto et al., 2021) Coordination is the ability to control body movements. Consequently, because growth and development are very important today, researchers chose junior high school students as research samples. To improve extracurricular programs, this research aims to achieve this. Understanding how hand-eye coordination and the top serve function in volleyball will help students understand the factors that influence their top serve abilities. Additionally, knowing who plays volleyball well can also help them understand who plays volleyball well.

In this process, eyesight and hands are necessary. In punching, for example, you have to stay focused on the object or target you are aiming for. Eye-hand coordination also affects the timing and accuracy of the shot. Accuracy refers to the speed of achieving the desired target, while time refers to punctuality. The desired connection between the hand and the object will result in efficient movement. The degree of accuracy of an object also determines how well it can achieve the goal. A good coordinator will find it easier to learn complex tactics and techniques.

Previous research conducted by (Ishak Aziz, 2020) Students will better understand the factors that influence their bottom serve ability by understanding how eye-hand coordination and the top serve function in volleyball. Additionally, knowing who plays volleyball well can also help them understand who plays volleyball well. According to (Imran et al., 2022) physical activity that a person does to maintain body health and keep the body in good condition which is done every day. Sport plays an important role in human life, in today's modern life humans cannot be separated from sports activities, sport teaches willpower, sportsmanship discipline, don't give up easily, have a high competitive spirit, work together, understand the rules and trust each other or make decisions.

Therefore, it is important to always strive for character education through various opportunities available both through curricular and extracurricular activities at school (Syaukani et al., 2024).

Extracurricular sports are one of the many factors that can support good habits in children. At this time, in various parts of the world sports have become the

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spotlight. Achievements in the field of sports are increasing and more and more athletes with good qualities are emerging from year to year. This cannot be separated from the role of schools in intensifying the provision of extracurricular sports as a form of improving physical education in schools (Indarto, 2024).

The arms are the dominant part of the body in volleyball. Judging from anatomy, the arm is the upper limb. As an upper limb, the arm consists of the entire arm, from the base of the arm to the tips of the fingers (Warthadi, 2012). Every lesson a child receives is the key to achieving aspects of development. Six aspects these are physical, motoric, social emotional, religious and moral, artistic, cognitive and language development (Fazrina, 2024). Physical condition to stay fit, one of the indicators for keeping the body fit is through physical activity (Jariono et al., 2020).

#### **METHOD**

This research method is a quantitative method with correlational tests. Quantitative method, namely an approach that emphasizes analysis of processed numerical (number) data. The research subjects were all players who actively participated in volleyball extracurricular activities as samples. The sample in this study was 10 extracurricular boys' volleyball students at SDN Sondakan, Laweyan District. Data collection techniques use tests and measurements. In principle, research is to measure what we are going to research, therefore there must be good measuring instruments. Measuring instruments in research are usually called research instruments.

#### **“Push-up” Arm Muscle Strength Test**

Arm muscle strength was carried out using a Push Up test on a sample of 10 people which was carried out for 1 minute. The equipment needed for the arm muscle strength push-up test is a mat, stopwatch, and measuring stationery. First, test takers face down and place their palms on the floor under their chest. If the arm is straightened, the elbow can be retained or locked. Place your feet shoulder width apart. To do this, the test taker must bend his arms while lowering his body until his chest can touch the counter's hand. Then, they should be pushed back to the starting position. Throughout the movement, the body must remain straight. Testee performs the test as long as they can without stopping. Based on the number of repeats correctly performed during 60 seconds, a score is given. The push up

position is shown in the following picture.



**Figure 1.** Push up test (Ertanto et al., 2021)

**Table 1.** Push-Up assessment for children aged 7-11 years

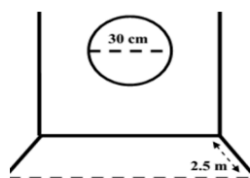
scores	Son	Criteria	Daughter
5	>38	Perfect	>21
4	29-37	Very well	16-20
3	20-28	Good	10-15
2	12-19	Enough	5-9
1	4-11	Not enough	1-4

(Pasaribu, 2020)

**Hand-Eye Coordination Test “Throw-Catch a Tennis Ball”**

The eye-hand coordination ability test carried out in this study was the Ball Warfen Und-fangen test (Sovenski, 2018) are as follows: Aim to measure eye-hand coordination. Tools: Tennis ball, a target made using paper shaped into a circle, stopwatch, measuring tape, research blanks, and writing tools.

Implementation: Players face the target wall perpendicularly at a predetermined distance by holding the ball in their hands, After the signal "yes" the player bounces off the target wall, from below then catches it. Return with alternating hands after the ball bounces, Players bounce off the target wall within 15 seconds with each player making two attempts, When bouncing off the target wall, the ball must not leave the target wall, if this happens it will be declared a failure. The value obtained by the player is obtained from the number of valid reflections within 15 seconds.



**Figure 2.** Hand-Eye Coordination Test Coordination Test (Ertanto et al., 2021)

### Volleyball bottom serve test

#### Implementation Instructions:

Before performing the test, the testee stands with the ball behind the service line. After the whistle signal sounds, the testee performs a top serve to hit the ball towards the target value that has been determined. The testee is given the opportunity to hit the ball 5 strokes. The score is determined by the number of balls that are able to enter the score area. The best possible score that can be obtained is 25 points.

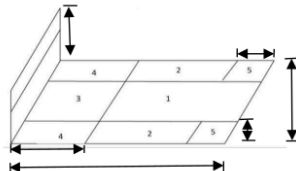


Figure 3: Lower Service Test Field (Ghani et al., 2020)

No	Value Interval	Information
1	5<	Very less
2	6-10	Not enough
3	11-20	Enough
4	21	Good

(Ghani et al., 2020)

## RESULT

### Data on upper arm muscle strength test results for male students at Sondakan Elementary School in 2024

The results of descriptive statistical analysis for the upper arm muscle strength variable obtained a maximum value of 20; minimum score of 14; mean value of 17.1; mode value of 15; The median value is 17 and the standard deviation is 2.132. The frequency distribution of arm muscle strength scores for male students at SDN Sondakan can be shown in Table 1, as follows:

Table 3. Frequency Distribution of Upper Arm Muscle Strength Variables

No	Evaluation	Frequency	Criteria
1	> 38	0	Perfect
2	29-37	0	Very well
3	20-28	2	Good
4	12-19	8	Enough
5	4-11	0	Not enough
Amount		10	

#### Data on Eye-Hand Coordination Test Results for Sondakan Elementary School Male Students in 2024

The results of descriptive statistical analysis for the hand-eye coordination variable obtained a maximum value of 15; minimum value of 10, mean value of 12.3; mode value of 10; The median value is 12 and the standard deviation is 1.889. The frequency distribution of hand-eye coordination scores for male students at SDN Sondakan can be shown in Table 2, as follows

Table 4. Frequency Distribution of Eye-Hand Coordination Variables

No	Results	Frequency
1	15	2
2	14	1
3	13	1
4	12	2
5	11	2
6	10	2
Amount		10

#### Data on Volleyball Bottom Serve Test Results for Sondakan Elementary School Boys Students in 2024

The results of descriptive statistical analysis for the lower serve variable in volleyball obtained values maximum 21; minimum value of 9 mean value of 15.5; mode value of 17; The median value is 17 and the standard deviation is 3.894. The frequency distribution of volleyball bottom serve scores for male students at SDN Sondakan can be shown in Table 3, as follows:

Table 5. Volleyball Bottom Serve Variable Frequency Distribution

No	Evaluation	Frequency	Criteria
1	< 5	0	Very less
2	6 - 10	2	Not enough
3	11 - 20	7	Enough
4	> 20	1	Good
Amount		10	

#### Multiple Correlation Test

Based on the results of the multiple correlation test, several results were obtained, namely 1) variable X1 with variable Y had a correlation coefficient value, namely  $r_{count} = 0.849 > r_{table} = 0.631$ , which means there is a relationship between upper arm muscle strength and the effectiveness of the lower serve in boys'

volleyball at SDN Sondakan; 2) on variable X2 with variable Y has a correlation coefficient value, namely  $r_{count} = 0.641 > r_{table} = 0.631$ , meaning there is a significant relationship between hand-eye coordination and bottom serve effectiveness; 3) variable X1 and variable X2 with variable Y have a coefficient value The double correlation, namely  $r_{count} = 0.804 > r_{table} = 0.631$ , means that **the relationship between upper arm muscle strength and eye-hand coordination** together with **the effectiveness of the volleyball bottom serve** for male students at SDN Sondakan in 2024 is significant.

## **DISCUSSION**

### **The Relationship between Upper Arm Muscle Strength and Effectiveness of the Lower Serve in Boys' Volleyball at SDN Sondakan in 2024.**

Arm muscle strength is one element of physical condition that is very dominant and is needed in almost all sports. To implement various skills or movement activities in playing volleyball, especially the bottom serve, a player must first have a good base of strength. This can be seen from the function of the arm used to swing when performing a bottom serve volleyball.

Strength has a broad meaning, there are also several perceptions when it comes interpret it. Nevertheless, Gazali states that component strength can be divided into several categories, including general, specific, maximum, endurance, absolute, and relative strength.

### **The Relationship between Eye-Hand Coordination and the Effectiveness of the Bottom Serve in Boys' Volleyball at SDN Sondakan in 2024.**

According to (Abizar & Fahrizqi, 2022) Coordination is a necessary component to be able to implement various strategies in sports well. Applied to the bottom serve in volleyball, the eyes function to perceive the object being targeted and when the ball will be hit, while the hand based on this information will make the shot by estimating the strength used so that the serve is on target.

### **The Relationship between Upper Arm Muscle Strength and Eye-Hand Coordination with the Effectiveness of the Lower Serve in Boys' Volleyball at SDN Sondakan in 2024.**

The bottom serve requires a series of skills to be able to do it well. Good arm muscle strength has a positive impact regarding the use of power in executing a punch. Meanwhile, eye-hand coordination combines the ability to see and the ability to hand. For example, in a volleyball game, before a hitting movement is

made, the eyes must be directed towards the target or object being aimed at.

The implementation of the ground serve requires skill in setting or processing the ball, both direction or aim and targets, short speed of movement of the ball, this requires movement power or strength towards the ball by hitting it through the medium or medium of the hand, especially those that are dominant in the fingers. (Ishak Aziz, 2020).

## CONCLUSION

Based on the results of the analysis and discussion presented, it can be concluded that arm muscle strength and eye-hand coordination have a significant relationship with the effectiveness of the underarm volleyball service for boys at SDN Sondakan in 2024. So that it can improve the ability to master volleyball playing techniques and achievements in participating in competitions.

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