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# Contribution of Arm Muscle Strength to Service Ability in Youth Football Games in Benteng Village, Sungai Batang District

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## ABSTRACT

This study aims to determine the contribution of arm muscle strength to serving ability in youth volleyball games in the Beneteng sub-district, Sungai Batang sub-district. The method used is the correlation method, namely the correlation analysis technique with product moment statistics. This research used a sample of 15 athletes taken using a sampling technique. The research population was teenagers from the Benteng sub-district, Sungai Batang sub-district. The research sample was 15 people with an age limit of 15 years. Data collected in this study used instruments (1) the arm muscle strength test and (2) the Volleyball Upper Serve Skills test. Based on the r table obtained for sample 15, the r table is obtained at 0.65. So hypothesis testing can be carried out, namely, if the calculated r is greater than the r table, then the alternative hypothesis is accepted. Based on the results obtained, it can be seen that the calculated r (0.409) is smaller than the table r (0.412). Therefore, it can be concluded that there is no relationship between arm muscle strength and upper serve results in male youth volleyball athletes in Benteng Village, Sungai Batang District. While the contribution is 16.72%.

**Keywords:** Arm Muscle Strength; Top Serve; Volleyball

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## INTRODUCTION

Volleyball is a team net game that is fun and interesting and only requires a little money to play. The volleyball game is played by two teams, each with six players. Volleyball games can be played on or off the court. The goal of playing volleyball is to keep the ball moving over the high net from one area to the opponent's area. Volleyball games can be played inside or outside the building.

Volleyball is a game with complex movements, namely a combination of walking, running, and jumping, as well as elements of strength, speed, ability, flexibility, and others. To be able to perform good volleyball movements requires adequate basic technical skills. There are five basic techniques for playing volleyball: Service, Passing, Set Up, Smash and block. Volleyball, one of the most famous ball sports, is played by two groups. In volleyball, each team consists of six players, and the game is played

between two teams over a net. A referee officiates the game. Volleyball is a game that is challenging for everyone to play (Aprili et al., 2020).

One of the basic techniques in playing volleyball is the top serve technique or techniques in starting a volleyball game. Top Serve is a basic service technique that begins with throwing the ball as necessary. Then, the server hits the ball with a hand swing from behind towards the opponent's target square over the net from above. To provide good service, you have to pay attention to several factors. The first factor is mastery of basic service techniques; apart from being able to serve well and accurately, other physical component factors support it.

Ponidin, et al. (2017) state that this is to serve as an action by a defender (position 1) action to hit the ball by throwing it up and then hitting it by swinging his arm from above with maximum power so that the ball flies quickly into the opposing team's court. The top serve is carried out from the back line of the playing court with due observance of the applicable service rules.

The serving technique is divided into two parts, upper and lower serving techniques, to achieve the best serving technique. Researchers will conduct a special investigation into the top service method. According to Beutelstahl (2011), the serve is the volleyball player's first shot to start the game. According to Pradana et al. (2019), the volleyball player first serves to start the game. Players must serve well so that it is difficult for the opponent to catch or receive the ball, which is very important for victory. Players must have the appropriate muscle strength to perform serving movements and good serving techniques.

Arm muscle strength can work optimally if the energy released can be controlled properly (Supriyanto & Martiani, 2019). Meanwhile, according to (Nurhasan, 2005), Strength is the ability of a group of muscles to withstand a maximum load. So muscle strength is the ability of a person's physical condition to withstand a load while working optimally. Lutan & Adang (2001) stated that strength is important to improve a person's overall physical condition. He also stated that muscle strength is the body's ability to use power. Strength is the driving force of every physical activity and is important in protecting athletes from possible injury. Strength can also enable athletes to run faster, throw further, lift heavier, pull, push, hit, kick harder and so on.

The ability of muscles to overcome load resistance to carry out activities is known as muscle strength, so it is an important component for athletes (Antara, Muscle, & With, 2023). Apart from that Isabella & Bakti (2021) states that muscle strength is important for athletes because it is a determinant or first step in physical activity. Agree Rahmadani (2017), who said that arm muscle strength is influenced by muscle work. Muscle work also affects temperature, blood pH, electrolytes, metabolic waste chemicals, and energy system problems. Meanwhile, according to Saptiani et al. (2019), strength is an important element in a sports activity because strength is a driving force that prevents injury. Apart from that, strength plays an important role in other components of physical ability, such as power, agility, and speed, so strength is the main factor in creating optimal performance.

More specifically, Suharman et al. (2018) explain that Strength is very important in sports activities because Strength is the driving force and prevents injury. According to several expert opinions, Strength is the ability to withstand a load in daily activities, especially in sports. The human body system creates movement by the collaboration of muscles and nerves that move the skeleton. Muscles and nerves work on orders from the brain to create the desired movement. Arm muscles are muscles that attach

to the upper and lower arms. Regular exercise is needed according to a sport to increase arm muscle strength.

Arm muscle strength is a very important ability in sports activities. Arm muscle strength is an inseparable element in volleyball when performing basic volleyball serve techniques. Strength is one dominant element of physical conditioning and is needed in sports. Therefore, arm muscle strength is important as a support or initial step in other physical activities.

## LITERATURE REVIEW

Lutan & Adang (2001) stated that strength is important to improve a person's overall physical condition. He also stated that 13 muscle strength is the body's ability to use power. Strength is the driving force of every physical activity and is important in protecting athletes from possible injury. Strength can also enable athletes to run faster, throw further, lift heavier, pull, push, hit, kick harder and so on.

Strength is an important element in the human body; as stated by Lutan et al. (2012), muscle strength is crucial in improving a person's overall physical condition. Strength has a broad meaning, with several views on interpreting it. Meanwhile, according to Nasution (2015), Strength is power and force, while in English, power is strength, which means the ability of muscles to contract optimally. According to Ismaryati in Septiani et al. (2009), strength is the muscle contraction power achieved in one maximum effort. A muscle or group of muscles carries out this maximum effort to overcome resistance.

(I. Marwan, Setiawan, & Wahidah, 2015) In another sense, muscle strength is a person's ability to exert maximum effort. Doing all these activities requires muscle strength. Supriyanto & Martiani (2019) in Kravitz 2001, muscle strength is the ability of muscles to use maximum force to lift loads. Strong muscles can protect the joints they surround and reduce the possibility of injury due to physical activity. Muscle strength is the ability of a group of muscles to generate or overcome the load resistance they face. The resistance or load that a person must overcome in a sport is varied and varied. This also requires various types of muscle strength (Suharno, nd).

According to Candra in Wismiarti (2020), Strength is the ability of a muscle group to overcome a load or resistance in carrying out activities. More specifically, Suharman et al. (2018) explain that strength is very important in sports activities because strength is the driving force and prevents injury. From several expert opinions above, it can be concluded that strength is the ability to withstand a load in daily activities, especially in sports. The human body system creates movement by the collaboration of muscles and nerves that move the skeleton. Muscles and nerves work on orders from the brain to create the desired movement. Arm muscles are muscles that attach to the upper and lower arms. Regular exercise is needed according to a sport to increase arm muscle strength.

In basic serving techniques, the physical component that volleyball athletes must have is arm muscle strength, which is useful for providing pushing power to the ball when serving. Arm muscle strength is crucial in playing volleyball, especially when performing top serves. Because the key to playing volleyball is arm muscle strength, the upper serve can be done well and correctly if the athlete exercises the arm muscles regularly, where the arm muscles are programmed properly while still paying attention to physical condition. Unsystematic physical conditions will be very dangerous because they can cause students to experience overtraining.

Volleyball is a team or squad game. Another basic rule is that volleyball can be played by bouncing with team members (friends) three times before crossing into the opponent's area. Initially, the basic idea of playing volleyball was to put the ball into the opponent's area through an obstacle like a rope or net to kill the ball in the opponent's area. In the game of volleyball, several techniques support the course of a match; one of the techniques that supports it is serving. Serve as the only technique used to start the game. Serving is the first basic step that must be mastered in playing volleyball.

Shaleh (2017) states that a serve is a ball shot from behind the end line of the playing field beyond the net into the opponent's area. Serve strokes are made at the start and after each error occurs. Because the serve plays a big role in getting points, the serve must be confident, purposeful, hard, and difficult for the opponent. A top serve is a type of serve that makes the ball's path contain no spin (the ball moves or floats). It is difficult for the opponent to receive a ball that floats and does not move in a straight path; the speed is irregular, and the ball often flies left and right or up and down, making it difficult to predict the direction the ball will come from precisely.

Performing upper serve movement skills requires the role of arm's length. This is because performing the top service movement in volleyball requires an arm swing movement that originates at the base of the arm, which provides the force of the blow when it hits the ball. The student can perform the upper serve well if the student has good and steady arm movements. The positive impact of long and regular arm movements related to using long levers when executing a blow. The type of top serve used in this research is the top spin service.

(Bela & Sari, 2017) An upper hand service is the prefix of throwing the ball upwards and hitting it by swinging the hand from above. The top serve is very good to use as the first attack because the opposing player does not easily receive the ball produced from the top serve, so it becomes a big advantage if you master the top serve well. This is due to several factors, one of which is the need for various applied training methods, making the training boring and less effective for improving trainees' ability. The programs used are not exactly targeted, so the right training methods are needed to train the top service to apprentice. Judging from the difficulty level, the upper serve has a fairly good difficulty when used as an opening attack.

According to Viera (2000), there are several stages in performing a volleyball top spin: (1) stand behind the court line. The position of one foot is in front, the body weight is on the sole of the front foot, and the shoulder is facing the net. Both knees are bent to form an obtuse angle, while the left hand supports the ball, and the right hand holds the upper ball. The gaze is directed at the ball in front. (2) bounce the ball approximately half a meter above your head and pull your hands behind you. Approximately the height of the ball within arm's reach immediately after the ball is hit. Hit the ball with your palms open and arms reaching as far as possible. Look at the ball when hitting. (3) After hitting the ball, follow it by stepping with your right foot as a follow-up movement. Then, enter the playing field and assume the normal ready attitude to play

Serving in volleyball is the initial technique to start the game. Serving is not only a sign to start a match but is an initial attack to gain points because the serve also plays a role in gaining points. Serving aims to direct and drop the ball into the opponent's empty area so the opponent cannot receive the ball. A strong service will

provide a level of difficulty for the recipient of the service. To do this, one thing you can do is support your service technique, namely arm muscle strength training.

## RESEARCH METHODOLOGY

This research was carried out using correlation research methods. (Arikunto, nd) states that "correlation is a statistical tool, which can be used to compare the measurement results of two different variables to determine the level of relationship between these variables". In this research, there are two variables, X and variable Y. Variable X, or independent variable, is arm muscle strength, and variable Y, or dependent variable, is top serve ability. This research is correlation research that compares measurement results. In this study, the population was 15 teenage athletes from the Benteng sub-district, Sungai Batang sub-district, with a total population and sample of 15 male athletes. The sampling technique in this research was total sampling. The data collection technique in this research was to test arm muscle strength using push-ups, and volleyball serve test instruments.

## RESULTS AND DISCUSSION

This study's arm muscle strength test results were measured using the *Push Up test*. Researchers asked 15 young male athletes to take the test *push-ups* to carry out the tests. The athletes were called individually and took positions, then the researcher gave a signal, and the students immediately carried out the hanging body lift ( *Push) activity*. To determine the arm muscle strength of athletes. For clearer results, see the frequency distribution table below;

**Table 1.** Frequency Distribution of Research Results on Arm Muscle Strength

| No | Score/Value | Frequency | Relative Frequency |
|---|---|---|---|
| 1 | 5 | 3 | 20% |
| 2 | 4 | 4 | 26.6% |
| 3 | 3 | 5 | 33.3% |
| 4 | 2 | 3 | 20% |
| 5 | 1 | 0 | 0 |
| | Amount | 15 | 100% |

Based on the table above, there are five values from the test results push-ups. According to the table above, it can be seen that three athletes got a score of 5 with a percentage of 20%. Furthermore, four athletes got a score of 4 with a percentage of 26.6%, 5 got a score of 3 with a percentage of 33.3%, and 3 got a score of 2 with a percentage of 20%. Based on the table above, it can be concluded that the results of the arm muscle strength of young male athletes in Sungai Batang Village have an average value of 3 with sufficient criteria. For more details, see the following figure 1. The next test is the top service test. In this test, researchers conducted a test to see how the service abilities of young male athletes in Benteng Village, Sungai Batang District were. The results of the top service tests can be seen in the table 2 below. Based on the table above, it can be seen that five athletes are in the interval values 4 - 6 and 7 - 9 with a percentage of 33.3%. Furthermore, two people are each in the interval value 10 - 12 and 13 - 15 with a percentage of 13.3%, and one athlete in the interval value 0 - 3 with a percentage of 6.6%. For more details, see the following Figure 2.

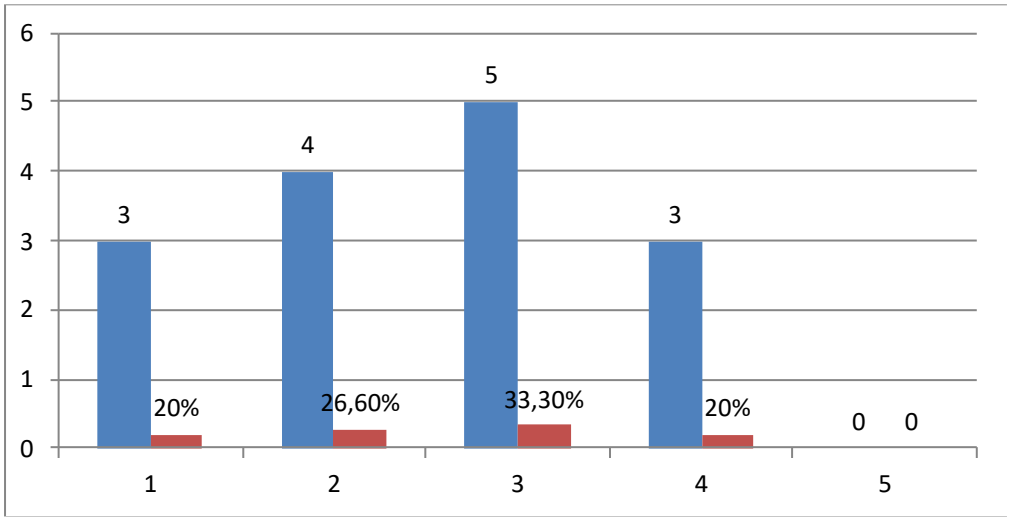


**Figure 1.** Frequency Distribution of Arm Muscle Strength

**Table 4.** Frequency Distribution of Serve Results in Volleyball

| No | Intervals | Frequency | Relative Frequency |
|---|---|---|---|
| 1 | 0 – 3 | 1 | 6.6% |
| 2 | 4 – 6 | 5 | 33.3% |
| 3 | 7 – 9 | 5 | 33.3% |
| 4 | 10 -12 | 2 | 13.3% |
| 5 | 13 – 15 | 2 | 13.3% |
| Amount | | 15 | 100% |

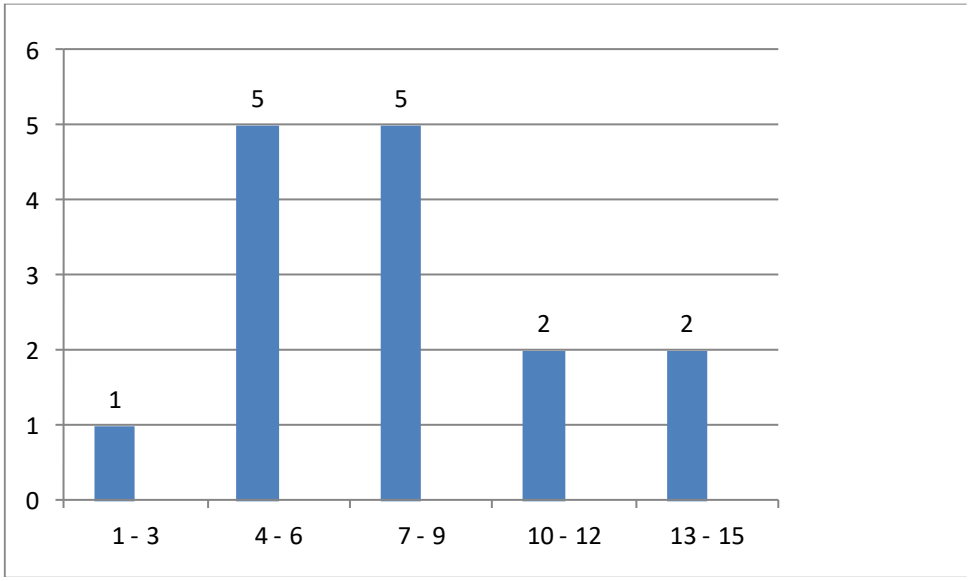


**Figure 2.** Upper Service Frequency Distribution

Based on the results of correlation calculations, the calculated r-value is 0.409. Test whether there is a contribution between variables x and y by comparing the calculated r value with the r table. Based on the r table obtained for sample 15, the r table is obtained at 0.65. So hypothesis testing can be carried out, namely, if the calculated r is greater than the r table, the alternative hypothesis is accepted. Based on the results obtained, it can be seen that the calculated r (0.409) is smaller than the table r (0.412). Therefore, it can be concluded that there is no relationship between arm muscle strength and upper serve results in male youth volleyball athletes in

Benteng Village, Sungai Batang District. Meanwhile, the contribution is 16%, and arm muscle strength has a 16% influence on the results of the top serve in Volleyball.

## DISCUSSION

Based on the results obtained from the test Push Up and Top Serve, the author tested the correlation between the two variables using the results of product-moment correlation calculations. Therefore, it can be concluded that the alternative hypothesis (Ha) in this study is rejected, namely that there is no contribution between arm muscle strength and the service results of teenage volleyball athletes in Benteng sub-district, Sungai Batang district. In other words, there is no significant correlation between arm muscle strength (measured via the Push Up test) and the service results of adolescent volleyball athletes. These findings suggest that arm muscle strength is not a dominant factor or plays a significant role in improving upper serve skills in the context of the population studied.

This research is correlation research; three variables, including two X variables and one Y variable, make this relationship research. Arm muscle strength is the variable X1, and hand-eye coordination is the variable. Data source sampling technique with certain considerations. Contribution of Arm Muscle Strength and Eye-Hand Coordination to Volleyball Serving Ability in Extracurricular Students at SMK Negeri 1 Sungai Apit, Siak Regency (Marwan et al., 2021).

The following conclusion can be drawn based on the results of research conducted on the arm muscle strength of male volleyball athletes at the Mufakat Volly Club (MVC) Pekanbaru to determine the extent of the contribution made by arm muscle strength to upper serve ability. There is a relationship between arm muscle strength. On the serviceability of Mufakat Volly Club male volleyball athletes (MVC) Pekanbaru (Gazali, 2016). Amrullah (2022) found that arm muscle strength does not have a significant relationship with the top serve; this is reflected in the R-calculation results, which are greater than the R-table. Similar findings between these two studies lend credibility and consistency to the conclusion that arm muscle strength may not be the dominant determining factor in determining upper serve results in adolescent volleyball athletes.

## CONCLUSION

Based on the results of research calculations carried out on teenage athletes in the Benteng sub-district, Sungai Batang sub-district, a conclusion can be drawn that the contribution value of arm muscle strength to serviceability in volleyball games is 16.72%.

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## CONFLICT OF INTEREST

There are no conflicts of interest in this article.

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