

The Contribution of the Dominant Factors of Physical Conditions with the Accuracy of Volleyball Spike in Class V Students of SDN 2 Bulu Nganjuk Regency in 2021

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ABSTRACT

The background of this research is observation in the form of analysis and study of volleyball games that do not only master tactics and techniques, but physical abilities related to arm muscle strength, eye-hand coordination, and motor processing techniques related to strike flexibility. In relation to the problem of factors to achieve maximum performance is the physical condition that may affect the accuracy of the spike.

In accordance with the formulation of the problem, the purpose of this study was to determine the correlation of leg muscle strength, eye-hand coordination and flexibility of the torso with normal spike accuracy in volleyball games for Students of Class V Elementary School 2 Bulu, Nganjuk Regency. The conclusion from the results in the field is that there is a relationship between Arm Muscle Strength and the ability to spike (X1 with Y) with the ability to spike, a correlation coefficient of $0.573 > r_{table} = 0.444$ for $\alpha = 5\%$, there is a relationship between Hand Eye Coordination and spike ability (X2 with Y) obtained a correlation coefficient of $0.532 > r_{table} = 0.444$ for $\alpha = 5\%$, there is a relationship between flexibility of the stick and the ability to spike (X3 with Y) obtained a correlation coefficient of $0.685 > r_{table} = 0.444$ for $\alpha = 5\%$ and there is a relationship between Strength Arm muscles, hand eye coordination, flexibility of the torso with the ability to spike (X123 with Y) obtained a correlation coefficient of 0.743. test the significance of the correlation coefficient with

the F test obtained $F_{count} = 7.033 > F_{table} = 3.23$ for $\alpha = 5\%$. From these results it can be concluded that there is a relationship from the three independent variables to the dependent variable. The most dominant factor in this study was the relationship between arm muscle strength and the accuracy of volleyball spikes.

Keywords: [Dominant factors, Physical Condition, Volleyball.]

INTRODUCTION

Volleyball is a type of big ball game. Volleyball game is played by two teams. Each team consists of six players. In volleyball games, each team reflects each other's balls that pass over the net or net. Each team tries to turn off the opponent's movement so that they are unable to return the ball from hitting or bouncing the ball from the opponent (Baharudin, 2017). Volleyball is also done to achieve an achievement that requires seriousness and discipline in training. Achieving high achievements requires several precisions that must be met in obtaining high achievements. An athlete does not only control the talent he has, but must have good physical, technical, tactical and mental conditions (Sujarwo, 2021).

In volleyball, basic technique is a fundamental factor that must be mastered by an athlete. By mastering the basic techniques of playing volleyball, it is hoped

that athletes will have the skills to play volleyball. The game of volleyball begins with serving, then being received by the opponent with the correct passing technique, and spikes using good technique can make the opponent lose control when receiving the spike and will be an advantage (adding points) for the opponent who spikes. Just as football or handball addicts crave spectacular goals, so do volleyball addicts crave brilliant spikes (Beutelstahl, 2016).

In addition to good mastery of basic volleyball techniques, there are elements that are no less important in playing volleyball, namely the element of physical condition. The physical condition is a unified whole of several components that cannot be separated from one another in an effort to improve and maintain the physical condition. According to (Mutohir, Toho Cholik, 2011) the elements of the physical condition include strength, endurance, flexibility, speed, power, agility, balance, coordination, and speed of reaction. In addition, athletes must have the basic potential of posture/physics, good mastery of tactics and techniques as well. The techniques in volleyball games include spike accuracy.

Spike accuracy is the accuracy in spiking the volleyball right at the desired target and can turn the opponent off. With this information, it is clear that in volleyball games, not only tactics and techniques are mastered, but physical accuracy related to arm muscle strength, hand eye coordination, and motor processing techniques related to the flexibility of the torso (Muharram, 2020). Factors for achieving maximum performance are physical conditions that may affect the accuracy of spikes in volleyball games including leg muscle strength, eye-hand coordination and strike flexibility. Therefore, the researchers conducted research on "The Contribution of the Dominant Factors of Physical Conditions with the Accuracy of Volleyball Spikes in Students of Class V Elementary School 2 Bulu, Nganjuk Regency , Nganjuk Regency in 2021".

LITERATURE REVIEW

The Nature of Volleyball

Volleyball is a game played by two teams, each consisting of six people. In volleyball games, each team reflects each other's balls that pass over the net or net. Each team tries to turn off the opponent's movement so that they are unable to return the ball from hitting or bouncing the ball from the opponent and each team can only play the ball three times by touching or hitting (Muharram, N. A., & Kholis, 2018).

According to Sujarwo, S., Suharjana, S., et., (2021) the game of volleyball was introduced by William G. Morgan, a physical educator at the Young Men Christian Association (YMCA), in the city of Holyoke, Massachusetts, United States of America, in 1895 as indoor recreational sports. William G. Morgan uses a tennis net which is suspended as high as ± 216 cm from the floor, then as a ball is used as the inside of a basketball. The ball is then bounced continuously over the net. At that time the ball must be reflected continuously over the net. The ball must not touch the floor. The name given to this new game is Minonette. This Minonette also has not been defined a certain touch limit. There is no rotation yet, while stretching your hands over the net with the intention of touching the ball in the opponent's area is allowed (Suhairi, M., Asmawi, M., et., 2020).

According to (Muharram, N. A., & Kholis, 2018) volleyball entered Indonesia in 1928 brought by Dutch soldiers and teachers (trainers) who were brought in from the Netherlands when they served in Indonesia. After Indonesia's independence, the former Dutch Armed Forces who joined the TNI, helped popularize volleyball. In 1951, the National Sports Week (PON) II was held in Jakarta. At that time volleyball games began to be competed so that volleyball games became more popular. Finally, in 1995 a volleyball organization was formed throughout Indonesia called the Indonesian Volleyball Association, abbreviated as PBVSI (Baharuddin, & Wahyuni, 2017). The basic techniques of playing volleyball

are passing over, passing down, Set-up/bait, Spike, Service, Block.

Leg Muscle Strength

Muscle strength is a very important component to improve overall physical condition. Because, firstly, strength is the driving force of any physical activity. Second, strength plays an important role in protecting athletes or people from possible injuries. Third, with strength, athletes can run faster, throw or jump higher and more efficiently, as well as helping to strengthen the stability of joints (Irianto, 2018).

As the upper limbs (Evelyn, 2019) argues that the lower limbs are connected to the body by a joint. The lower limbs consist of three parts, namely the upper limbs, lower limbs and feet. The thigh muscles include the hamstrings, the medial side of the thigh and the front. The hamstrings consist of the biceps femoris, semitendinosus and semimembranosus. The medial side of the thigh includes the pectineus, adductor longus, gracilis, and external obturator.

Hand Eye Coordination

Coordination is a person's accuracy in assembling several elements of a movement into a movement that is aligned with its goals (Irianto, 2018). Meanwhile, according to (Sajoto, 2002) "Coordination is the accuracy of a person integrating a variety of different movements into a single movement pattern effectively", (Muharram, 2020) states that training activities must focus on coordination exercises, because good coordination will provides harmonious integration of the entire movement in a smooth, controlled and efficient action. The accuracy of coordinating eyes and hands will be very useful in supporting service, passing, blocking, set-up, and smash skills in volleyball (Arfa, M., Akhmad, I., & Nugraha, 2019). From the description above, it can be concluded that eye-hand coordination is a combination of work between the eyes and hands to carry out certain movement goals.

Flexibility of Torso

Flexibility is the area of joint motion or the accuracy of a person to move the limbs at a certain range of motion in a joint. Flexibility can be lifted in the form of swinging, rotating, and bouncing or moving the limbs (Suhairi, M., Asmawi, M., et., 2020). Meanwhile, Mutohir, Toho Cholik, 2011 flexibility implies the accuracy of the joints to perform movements within the range of motion of the joints to the fullest according to their movements (range of movement). According to Ananin, A. S., & Bulykina, 2017 joint flexibility is the area of movement of the muscles and joints of the body. This flexibility is closely related to the accuracy of the skeletal muscles of the body.

Spike Accuracy

Spike is an act of hitting the ball hard using a certain technique so that the ball can enter the opponent's field in the hope that it cannot be dammed by the other team in the game, so that it can score. This action is carried out when the ball is bouncing over the net either produced by bait or passing by a playmate or a ball coming from the opponent's direction which is used to make a hard hit. Spike is the movement of hitting the ball hard into the opponent's field area, the ball passes over the net with the hope that the opponent will have difficulty returning the ball (Ahmadi, 2017). According to (PBVSI, 2016) the spike is the most important attack blow, as a mainstay for beating opponents in an effort to achieve victory. The process of smashing can be divided into several stages, namely prefix, repulsion, jumping, hitting the ball, landing (Nasuka, 2019).

MATERIALS & METHODS

This research approach used a quantitative approach. The sample used was all fifth grade students at SDN 2 Bulu, Nganjuk Regency, totaling 15 people. According to Sugiyono, (2018) if the population is relatively small, less than 30 people, or

research that wants to make generalizations with very small errors.

Data collection techniques in research are test and measurement techniques. According to (Ismaryati, 2015) a test is an instrument or tool used to obtain information about individuals or objects. The test was carried out on the volleyball court by collecting data from tests of leg muscle strength, hand eye coordination, flexibility of the torso, and accuracy of the volleyball spike. Before carrying out the analytical test, a prerequisite test was carried out to determine the feasibility of the data, namely the normality test and homogeneity test using SPSS assistance. Data analysis technique was using descriptive analysis.

RESULT

Based on the normality test of the variable eye-hand coordination, torso flexibility, arm muscle strength, and the accuracy of volleyball spikes in fifth grade students at SDN 2 Bulu Nganjuk, the distribution is normal and the variables are homogeneous, while the results of the linearity test for arm muscle strength, hand-eye coordination, and stick flexibility have A linear relationship to the accuracy of smashes on volleyball is shown from the results of the F test which obtain a significance greater than 0.05.

Testing the research hypothesis was using simple and multiple regression techniques with the help of the SPSS program. The results of the calculation of data analysis are as follows.

Table of Hypothesis Test Results

Source of Variation	R	R Square	df 1	df 2	F _{counted}	F _{table}
X1 with Y	0,573	0,397	1	17	12,256	4,41
X2 with Y	0,532	0,253	1	21	8,047	4,41
X3 with Y	0,631	0,399	1	21	14,976	4,41
X ¹²³ with Y	0,743	0,475	3	19	8,178	3,23

The results of the analysis between arm muscle strength and spike accuracy obtained a correlation coefficient of $0.573 > r_{table} = 0.444$ for $\alpha = 5\%$ with $N = 15$, so that it was stated that there was a significant relationship between arm muscle strength and smash accuracy in volleyball games in class V SDN 2 Bulu Nganjuk Regency. And the results of the regression equation analysis with the F test obtained F count = $12.256 > F_{table} = 4.41$ for $\alpha = 5\%$ with dk (1:17). Thus the regression equation obtained can be used to describe the shape of the relationship between hand eye coordination and the accuracy of volleyball spikes.

The results of the analysis between the relationship between eye coordination and spike accuracy obtained a correlation coefficient of $0.532 > r_{table} = 0.444$, it can be stated that there is a significant relationship between eye coordination and spike accuracy in volleyball in Class V SDN 2 Bulu, Nganjuk Regency. The results of the regression equation analysis with the F test obtained F count = $8.047 > F_{table} = 4.41$.

Thus the regression equation obtained can be used to describe the shape of the relationship between hand eye coordination and the accuracy of volleyball spikes.

The results of the analysis between the flexibility of the strike and the accuracy of the upper smash obtained a correlation coefficient of $0.685 > r_{table} = 0.444$, it was stated that there was a significant relationship between the flexibility of the strike and the accuracy of the volleyball smash in Class V SDN 2 Bulu, Nganjuk Regency. The results of the regression equation analysis with the F test obtained F count = $14.976 > F_{table} = 4.41$. Thus the regression equation obtained can be used to describe the shape of the relationship between arm muscle strength and the accuracy of the spike on volleyball.

The results of the analysis between arm muscle strength, hand eye coordination, torso flexibility with smash accuracy obtained a correlation coefficient of 0.743. test the significance of the correlation coefficient with the F test obtained Fcount = $7.033 > F_{table} = 3.23$. Based on these

results, it can be stated that there is a significant relationship between arm muscle strength, eye-hand coordination, flexibility of the kick and the accuracy of volleyball spikes in class V SDN 2 Bulu, Nganjuk Regency.

Hypothesis test shows that arm muscle strength contributes to the accuracy of the volleyball smash more dominantly than hand eye coordination and torso flexibility.

DISCUSSION

The correlation between arm muscle strength and spike accuracy

Arm muscle strength when hitting a spike in volleyball plays a very important role in the accuracy of hitting a good ball. This was proven through this study, where there was a significant relationship between arm muscle strength and the accuracy of volleyball spikes in Students of Class V Elementary School 2 Bulu, Nganjuk Regency, Nganjuk Regency. As for the degree of correlation between arm muscle strength and the accuracy of the upper spike, it is quite closely shown by the correlation coefficient of 0.573 which is at a correlation index of 0.5-0.7.

From the findings obtained in this study, there is a fairly close relationship between arm muscle strength and the accuracy of the spike in volleyball, which is very reasonable because the accuracy in coordinating the spike area and the position of the direction of the arm used to hit quickly is very beneficial for players because they can direct the spike ball in the direction the desired ball and even a form of ball attack which is difficult to block by the opponent by placing the ball in the opponent's empty area.

According to Greg Brittenham (1996; 63), good coordination will provide a harmonious integration of the entire movement in a smooth, controlled and efficient action. Therefore, in an effort to improve the accuracy of the volleyball spike, it can be tried by increasing the strength of the players' arm muscles so that

players can hit the ball with various variations.

Correlation of hand eye coordination with volleyball spike accuracy

Eye-hand coordination is an important component in sports activities, especially volleyball spike movements, because if viewed from the mechanics of volleyball spike motion, the most dominant movement is the eye and hand movements in line with the target or purpose or direction of the smash. The more hand eye coordination can go well, the greater the points from the spikes generated to add points to each team. And of course with greater power, the results of the spike will be harder and sharper. This fact was proven through this study where it was found that there was a significant relationship between hand eye coordination and the accuracy of volleyball spikes in Students of Class V Elementary School 2 Bulu, Nganjuk Regency, Nganjuk Regency. The degree of relationship between eye-hand coordination and smash accuracy is less closely shown from the correlation coefficient value of 0.532 which is at a correlation index of 0.4-0.6.

Correlation of Torso Flexibility with volleyball spike accuracy

Flexibility of the torso is an important component in sports activities, especially the movement of the volleyball spike, because if viewed from the mechanics of motion, in volleyball spikes the most dominant is the movement of the torso and arms lashing forward. The wider the amplitude of the torso, the greater the power generated by the arm to hit the ball. In this study, there was a significant relationship between torso flexibility and spike accuracy in volleyball in Class V SDN 2 Bulu, Nganjuk Regency. The degree of relationship between the flexibility of the torso and the accuracy of the smash is not very close, as shown by the correlation coefficient of 0.631 which is at a correlation index of 0.6-0.8.

These results are supported by the opinion (De Waelle, S., Warlop, G., Lenoir, M., Bennett, S. J., & Deconinck, 2021) that in sports flexibility is useful for making it easier for athletes to master high techniques, reducing the occurrence of injuries, the art of movement is reflected in high flexibility, and increase agility and movement speed. The relation is in the implementation of volleyball spike starting from an upright standing position, throwing the ball over the head, leaning back, hitting the ball with or without jumping.

Correlation of arm muscle strength, hand eye coordination and torso flexibility with spike accuracy

Elements of arm muscle strength, hand eye coordination and flexibility of the strike are quite closely related to the accuracy of volleyball spikes. Among the three components, it turns out that arm muscle strength contributes the most to the accuracy of volleyball spikes, followed by eye-hand coordination and finally torso flexibility. Through high arm muscle strength and supported by a large torso flexibility, a volleyball athlete can hit the ball hard and fast. Furthermore, the accuracy of hitting the ball hard and supported by the accuracy of studying the direction of the ball to be aimed properly will result in a hard and accurate ball hit that will make it difficult for the opponent to return the spike ball.

According to Amaral Machado, T., et., 2019 emphasized that the elements of physical condition must be improved as optimally as possible for each athlete and strength is a more dominant element than the others which needs to be given top priority in implementing the training program. In addition to strength, there are other components that need to be considered in hitting a spike in volleyball, namely elements of hand-eye coordination and flexibility, because good hand-eye coordination will allow a person to have the accuracy of swinging his arm in the direction of the ball to be desired, which makes it difficult for the opponent to reach

it, while with flexibility a large torso, the motion of the swinging arm backwards will be more perfect so that it can produce an increasingly large prod, which in turn will make the direction of the ball sharper.

CONCLUSION

Based on the results of the research and discussion, it can be concluded as follows: 1) There is a relationship between arm muscle strength and the accuracy of volleyball spikes in Class V SDN 2 Bulu, Nganjuk Regency. 2) There is a relationship between hand eye coordination and the accuracy of volleyball spikes in Students of Class V Elementary School 2 Bulu, Nganjuk Regency. 3) There is a relationship between torso flexibility and the accuracy of the volleyball spike in Students of Class V Elementary School 2 Bulu, Nganjuk Regency. 4) Taken together, there is a relationship between arm muscle strength, eye-hand coordination and flexibility of the torso with the accuracy of volleyball spikes in Students of Class V Elementary School 2 Bulu, Nganjuk Regency. 5) The most dominant factor in this study was the relationship between arm muscle strength and the accuracy of volleyball spikes for Students of Class V Elementary School 2 Bulu, Nganjuk Regency.

Declaration by Authors

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