The Contribution the Physical Condition on Underhand Serve Ability in Volleyball of Elementary School Students in Makassar City

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ABSTRACT

This research is a type of descriptive study that uses a "correlational" research design. This study aims to determine the contribution of physical condition to the ability to serve in volleyball of elementary students. The physical condition indicated on arm muscle strength, length of the arm, hand-eye coordination. The population is the whole elementary school students in Makassar. The sample used was 90 people. The technique of determining the sample is by random selection (simple random sampling). Data analysis techniques used were descriptive analysis, correlation coefficient analysis (r), and the results of multiple correlation analysis (R) at a significant level $\alpha = 0.05$. The results showed that the three indicators of physical condition contributed to the ability to serve in a volleyball game. Furthermore, simultaneously the three variables also contribute to student ability with a percentage of 86.30%.

Keywords: Underhand serve, arm muscle strength, arm length, hand-eye coordination

1. INTRODUCTION

Physical education and sports are an integral part of general education. It develops the cognitive aspect and the education aims to develop physical fitness, movement skills, critical thinking skills, social skills, reasoning, emotional stability, moral actions, and a healthy lifestyle. Consequently, the physical education program should be planned systematically to achieve national education goals [1], [2].

The volleyball game is one form of a big ball game that has developed rapidly in Indonesia. Volleyball is a sport that is played by two teams where each team consists of two to six players in a field measuring 30 square feet (9 square meters) for each team, and the net limits both teams. This sport also popular among children, adolescents, adults, and parents, both men and women. The popularity of volleyball is a natural thing because it requires a variety of scenes of movement and high skill techniques to do well [3]. The main objective in this game is to hit the ball in the direction of the opponent's field so that the opponent cannot return the ball. The gamer's performance is achieved through three touches consisting of the passage of the forearm to the feeder, which is then given to the attacker, and a spike directed to the opponent's field [4].

The volleyball game is very much determined by the mastery of technique, teamwork tactics, and the players' physical condition. The quality of the game is mostly determined by the perfection of expertise of basic techniques. The more perfect mastery of basic techniques, the more quality the game is displayed. The basic methods in volleyball are serving, passing, smash, blocking [5]

One of the techniques in volleyball is serving. The serving was only the opening blow to start a volleyball game and the first attack in a volleyball game that was very deadly to the opponent. But now in accordance with the progress of the game, in terms of tactical, serving is an attack to get value. Servicing is the act of placing the ball into a game. Which is done by the defender, carried out behind the backline by hitting the ball with one hand.

Elementary school students as beginners in volleyball practice, must be introduced to simple training techniques. The technique is adapted to students' cognitive abilities and physical conditions. Teachers' experience in primary schools describes that many students do not know how to care or have not been able to cross the net. Meanwhile, to take advantage of the learning process to serve in a good volleyball game or optimally, there needs to be support or physical elements.

Without adequate physical conditions, the down serve movement technique cannot be carried out correctly. It is easy to experience a decreased ability to concentrate. The ability will affect the appearance of motion in underhand serve.

Components of physical condition needed to support effective under servicing ability are arm muscle strength, arm length, and hand-eye coordination. The role of arm muscle strength supports the ability to move backward. It performs reflection movements on the arm muscles with maximum contraction to increase the power of the serve punch [6]. Suppose the strength of the arm muscles can be maximized in the process of volleyball serve movement. In that case, it will support the power or force to hit the ball powerfully and quickly. Arm muscle is important because it is the center of energy so that arm muscle strength will support power in other body parts.

Arm length also supports the serve ability in volleyball. Furthermore, the arm's length has a share or a role in serving under, whereby having a long arm length has a good height so that when performing serve can be optimal [7].

The role of eye-hand coordination has an essential role in the ability to serve down. Where the serve movements are related to swinging the arm and pushing the ball. Hence, the ability to coordinate hand movements with the help of vision great determines the effectiveness of the ball's return made through the underhand serve down. Lack of eye-hand coordination in serving under the volleyball will result in stiff movements. As a result, the swinging of the arm is never directed properly. With the ability to coordinate hand movements with the help of vision towards the target or to a friend, it is crucial to determine the effectiveness of the underhand serve performed

2. METHODS

The research conducted a quantitative method and involved 90 students of elementary schools in Makassar. All samples were grade IV in five elementary schools. The dependent variable is Underhand serve or the ability of students to serve the correct technique that crosses over the net and falls on the opponent's field target while the independent variable are arm muscle strength, arm length, and hand-eye coordination.

Arm strength is to provide information about the strength of a group of muscles working in sports and other physical activity forms. To measure the strength of the arm muscles the subject needs to push-ups for 30 seconds. The length of the arm in question is a condition that describes the upper limb. Furthermore, hand-eye coordination can coordinate the eyes and hands in bouncing the ball against the wall or bypassing movements towards the target until a predetermined time limit.

The researchers used many tools to measure the student to serve accuracy. The tools are volleyball court, two balls, ropes with a length of 10 meters and paper.

The implementation test started on the taking position of participants outside of the field line. Furthermore, the participants perform prefix serves as trial for adaptation and relaxation. The real test includes 10 treatments of serving. From the ten opportunities given, the student assessed based on the number points are included in each column (area) of the field. The final score is the number of points from 10 times serve.

After collecting the data, researchers continue to test the hypothesis by SPSS program. linear regression analysis is used to analyze the contribution of independent variables to the dependent variable.

3. RESULTS AND DISCUSSION

3.1. Descriptive Analysis

The description of the data of arm muscle strength, arm length, hand-eye coordination and underhand serve ability in volleyball games are presented on Table 1.

Table 1. Descriptive Analysis

Statistic	Variable			
	X1	X2	X3	Y
(n)	90	90	90	90
Min	7.00	50.90	1.00	2.00
Max	14.00	63.70	13.00	13.00
Range	7.00	12.80	12.00	11.00
Mean	9.6667	56.5800	7.2333	6.8333
Median	9.5000	55.9000	8.0000	6.0000
SD	1.91785	3.44458	3.15882	3.10820
Varians (S2)	3.678	11.865	9.978	9.661

Based on research data, the underhand serve ability (Y) in volleyball game obtained a minimum value of 2 points and a maximum value of 13 points, with a range of 11 points. The average value is 6.83 points, median value is 6 points, the standard deviation is 3.10 points, and the variance is 9.66 points.

The data of arm muscle strength variable (X1), obtained a minimum value of 7 times and a maximum value of 14 times, with a range of 7 times. The average value is 9.66 times, has a median of 9.50 times, with a standard deviation of 1.91 times, and a variance of 3.67 times.

The data of the arm length variable (X2), obtained a minimum value of 50.90 cm and a maximum value of 63.70 cm, with a range of 12.80 cm. The average value of 56.58 cm, has a median of 55.90 cm, with a standard deviation of 3.44 cm, and variance of 11.86 cm.

The hand-eye coordination variable (X3) data obtained a minimum value of 1 time and a maximum value of 13 with a range of 12 times. The average value is 7.23 times, has a median of 8 times, with a standard deviation of 3.15 times, and a variance of 9.97 times.

Table 2. Summary Table of Kolmogorov Smirnov Normality Test Results

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Arm Muscle Strength	.136	90	.165	.943	90	.107
Arm Length	.145	90	.109	.944	90	.119
Hand-Eye Coordination	.137	90	.156	.965	90	.421
Underhand Serve	.139	90	.144	.944	90	.114

Based on the table, the significance of each group of data is more than 0.05. Thus, it can be concluded that the sample of this study came from populations that were normally distributed. This conclusion implies that statistical analysis can be used to test the hypotheses proposed in this study so that the first requirement for testing hypotheses has been fulfilled.

3.3. Homogeneity Test

A homogeneity test is performed to determine whether the data in variables are homogeneous or not.

Table 3. Data Summary of Homogeneity Test

Underhand Serve Ability	Levene Statistic	df1	df2	Significance
Result	0.059	1	88	0.809

3.4. Linear Regression Analysis

The linear regression test is used to test the effect of variables partially. The t-test results as the statistical calculations are described as follows.

Table 4. Linear Regression Analysis

Dependent	Independent	R square	F	Sig
Underhand Serve	Arm Muscle Strength	0.783	0.578	0.000
Underhand Serve	Arm Length	0.730	1.976	0.004
Underhand Serve	Hand-Eye Coordination	0.721	0.774	0.002

The t-test resulted that the significant value of arm muscle strength is 0,000 (less than 0.05). It means that arm muscle strength affects the underhand serve ability of children.

3.2. Normality Test

Because the data processing in this assessment uses statistical tests with regression, it is necessary to test the analysis requirements. The test requirement is the normality test using the Kolmogorov Smirnov test

A similar result of P-value for other independent variables. The analysis resulted that the independent variables have a contribution to serve ability of children. The R-square value or coefficient determination indicated the contribution of independent variables affects to the service ability.

The highest of R-square value showed in arm muscle strength. It means that arm muscle strength is the essential condition to increase the students' ability. Even though the arm length and hand-eye coordination also has god contribution. The multiple regression analysis used to predict the contribution of independent variables simultaneously. The analysis used F-test that showed in Table 5.

Table 5. Multiple Regression Analysis

Dependent	Independent	R square	F	Sig
Underhand Serve	• Arm Muscle Strength • Arm length • Hand-Eye coordination	0.863	0.356	0.000

The analysis results show a significance value of 0.000, which means the three variables simultaneously influence the underhand serve. The contribution is simultaneously higher than the partial contribution. This analysis is a reason for teachers to encourage students to improve the three physical conditions.

Arm muscle strength is the ability to generate tension in overcoming the burden of resistance in carrying out an activity. Arm muscle strength was measured using a stopwatch with 30 seconds. Suppose the strength of the arm muscles is muscular. In that case, it will undoubtedly have an effect on providing optimal results in serving down the volleyball game [8]. In contrast, the arm's length is the distance from the upper bone of the arm (*humerus*) to the cubit bone *(ulna)*. To produce the bottom serve ability in an optimal volleyball game. Suppose the children have adequate arm length when

performing underhand serve skills in volleyball. In that case, it will undoubtedly contribute to providing maximum results. Suppose the length of the arm is considered. In that case, physiologically, it will produce lower servicing ability in a better volleyball game. Arm length is a precondition that supports various sports, including volleyball, especially underhand serve. Because with a long arm means having a strong arm, and this is very supportive of achieving optimal under-serve results. This study has produced what has been produced, which shows the contribution of arm length with underhand serve ability in volleyball games.

Eye-hand coordination is the movement that occurs from information that is integrated into the limb movements [9]. So, eye-hand coordination in underhand serve is needed to provide optimal results. Suppose hand-eye coordination is held in the underhand serve. In that case, it will undoubtedly contribute to providing the underhand serve ability in good volleyball games.

If eye-hand coordination is considered in the underhand serve, then physiologically will encourage the optimal volleyball game's ability.

4. CONCLUSION

The results showed that the three indicators of physical condition contributed to serving in volleyball game. Furthermore, simultaneously the three variables also contribute to student ability with a percentage of 86.30%. The contribution is simultaneously higher than partial contribution. This analysis is a reason for teachers to encourage students to improve the three physical conditions

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