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Contribution Of Arm Muscle Strength and Hand-Eye Coordination Towards The Underard Passing Ability Of Students In Volleyball at UPT SDN Mangasa

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Abstract*:* This research is descriptive. The objectives of this study were to determine whether arm muscle strength contributes to the underhand passing ability of volleyball students at the SPF Elementary School (UPT SPF) of Mangasa, Makassar, and to determine whether arm muscle strength and hand-eye coordination contribute to the underhand passing ability of volleyball students at the SPF Elementary School (UPT SPF) of Mangasa, Makassar. The population was all fifth-grade male students at the SPF Elementary School (UPT SPF) of Mangasa, Makassar. A sample size of 30 students was selected. Data analysis techniques used were descriptive statistical analysis and inferential statistical analysis.
The results showed that of the 30 students, the determination coefficient for arm strength to underhand passing ability reached 72.60%. The coefficient of determination for hand-eye coordination to underhand passing ability reached 72.10%. The coefficient of determination for arm strength and hand-eye coordination to underhand passing ability reached 79.50%.

Keywords: Contribution, Arm Strength, Hand Eye Coordination, and Underhand Passing Ability

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INTRODUCTION

Sport is an activity that involves exertion of physical and mental energy, designed to train the human body, both physically and spiritually. It is a truly essential activity for maintaining one's health. One of the most popular sports, particularly in Indonesia, is volleyball. This sport is often played by all elements of society, from adults to children. Even today, volleyball has become a national sport in Indonesia. Efforts to create a holistic Indonesian society and develop Indonesia as a whole, with quality human resources, can only be realized through proper physical growth and development. In this regard, fostering and promoting sports must receive increased attention and support from all parties, especially the government. In line with these efforts, achieving stages where the importance of improving certain achievements impacts physical fitness as a measure of a person's quality of life, which will be reflected in the development of Indonesians with quality human resources.

In volleyball, one of the basic skills that must be mastered is the underhand pass. This skill is essential for all volleyball players. The underhand pass is the fundamental technique used to receive serves, spikes, hit the ball below waist height, and hit balls bouncing off the net. The underhand pass is the beginning of an attack in volleyball. The success of an attack depends on the quality of the underhand pass. If the ball is poorly passed, the passer will have difficulty placing the ball well for the attackers.

When executing the underhand pass, eye-hand coordination is crucial. To achieve optimal underhand passing, coordinated movements are needed to demonstrate a unified, effective underhand movement. Achieving this coordination requires regular, planned, and intensive practice to develop skilled movements and effective underhand passing techniques. The key movements required for ball control include eye-hand coordination in contact with the ball, hand placement, and control, as well as the ability to bounce the ball effectively. Players who possess

these skills and master the underhand pass technique will be able to master and navigate game situations. Underhand passing requires significant arm muscle strength, particularly when swinging the arm. Without proper arm strength, the ball will likely miss its intended direction. Therefore, arm muscle strength is crucial for underhand passing in volleyball.

The differences in underhand passing ability require investigation, as to whether they are due to differences in physical condition, particularly arm muscle strength and hand-eye coordination, or other factors. Observations show that volleyball is a popular sport among students at SPF Elementary School Mongisidi III Makassar. Observations also indicate that students lack effective underhand passing skills. Many underhand passes are inaccurate due to a lack of composure, leading to errors in accuracy. Furthermore, hand positioning is often inadequate. Underhand passing is crucial for winning a set, especially for beginners like the students at SPF Elementary School Mangasa.

METHODS

This type of research is correlational research. Correlational research is the relationship between two or more variables as they exist without any treatment (Ma'ruf Abdullah, 2015:321). This research was conducted at SDN Mangasa Makassar.

A population is a generalized area consisting of objects/subjects possessing certain qualities and characteristics determined by the researcher to be studied and then conclusions drawn from. Therefore, the population includes not only humans but also other objects and natural objects. A population is not simply the number of objects/subjects studied, but also encompasses all the characteristics/traits possessed by those objects (Sugiyono 2018; 117). Therefore, in this study, the population is all students at SDN Mangasa Makassar.

According to Sugiyono (2018: 118), a sample is a portion of the number and characteristics of a population. If the population is large and the researcher cannot study everything in the population, a sample is a portion of the population taken using a specific technique. The sample size was determined using random sampling. Because the population size in this study was too large, the researcher used simple random sampling by drawing lots. According to Ma'ruf Abdullah (2015:234), the method of determining the sample uses a random sampling technique. The sample used in this study was 30 students from SDN Mangasa Makassar.

Research Method

"Quantitative research can be defined as a research method based on the philosophy of positivism, used to study specific populations and samples. Sampling techniques are generally random, data collection uses research instruments, and data analysis is quantitative/statistical with the aim of testing the established hypotheses (Sugiyono, 2018:14)."

1. Research Variables.

"There are two variables involved in this research: the independent variable and the dependent variable (Ma'ruf Abdullah, 2015:192)":

a) Independent Variable. (independent variable), is the variable that determines the direction or specific change in the dependent variable. Conversely, the independent variable is in a position that is not affected by the dependent variable (the influencing variable).

1) Arm Muscle Strength

2) Hand-Eye Coordination

b) Dependent Variable, is the variable that is influenced by the independent variable (the influencing variable).

1) Volleyball Underhand Passing Ability

RESULT AND DISCUSSION

Based on the results of statistical analysis based on survey research conducted at Mangasa Makassar State Elementary School, the following are the results of ball passing ability, arm muscle strength and hand-eye coordination which are presented in table 1 below:

Statistical Values	Variable		
	Arm Strength (X_1)	Hand-Eye Coordination (X_2)	Downward Passing Ability (Y)
Number of Samples	30	30	30
Maximum Value	12	15	12
Minimum Value	2	8	2
Range	10	7	10
Mean	5.63	10.77	6.17
Median	5.00	11.00	6.00
Standard Deviation (s)	2.822	1.924	2.640
Variance (S^2)	7.964	3.702	6.971

1. Data Normality Test

The results of the data normality test for each variable can be formulated as follows:

a. The normality test for arm muscle strength data yielded a value of 0.669 (P = 0.762 > α 0.05), indicating a normal distribution for the arm muscle strength data.
b. The normality test for hand-eye coordination data yielded a value of KS-Z = 0.666 (P = 0.768 > α 0.05), indicating a normal distribution for the hand-eye coordination data.
c. The normality test for underhand passing ability yielded a value of KS-Z = 0.600 (P = 0.865 > α 0.05), indicating a normal distribution for the underhand passing ability data.

3. Hypothesis Testing

a. The Contribution Between Arm Muscle Strength and Underhand Passing Ability of Students at Mangasa Elementary School, Makassar

The first hypothesis tested in this study was "there is a relationship between arm muscle strength and underhand passing ability of students at Mangasa Elementary School, Makassar." Based on the results of a survey conducted at Mangasa Elementary School, Makassar, the correlation analysis data related to underhand passing ability are presented in the following table.

Table 2. The first hypothesis is the relationship between arm muscle strength and underhand passing ability.

correlation	**N**	**r**	**P_{value}**	Significant
X_1.Y	30	0,726	0,000	Description

From the results of the correlation coefficient significance test calculation, it is known that Fcount = 31.167 is greater than Ftable = 4.17 at α = 0.05. Based on these results, it can be concluded that the correlation coefficient between arm strength and underarm passing ability (ry2) of 0.726 is significant. Thus, the first hypothesis states that there is a contribution of arm strength to underarm passing ability in volleyball games by students of UPT SDN Mangasa Makassar. In other words, the better the arm strength, the better the underarm passing ability in volleyball games.

b. The Relationship between Hand-Eye Coordination and Underhand Passing Ability of Students at Mangasa Elementary School, Makassar

The second hypothesis tested in this study was "there is a relationship between hand-eye coordination and underhand passing ability of students at Mangasa Elementary School, Makassar." Based on the results of a survey conducted at Mangasa Elementary School, the correlation analysis data related to underhand passing ability are presented in the following table:

Table 3. The second hypothesis is the relationship between hand-eye coordination and underhand passing ability.

correlation	N	r	P_{value}	Significant
X_2.Y	30	0,721	0,000	Description

From the results of the correlation coefficient significance test calculation, it is known that Fcount = 30.245 is greater than Ftable = 4.17 at α = 0.05. Based on these results, it can be concluded that the correlation coefficient between hand-eye coordination and underhand passing ability (ry2) of 0.721 is significant. Thus, the second hypothesis states that there is a contribution of hand-eye coordination to underhand passing ability in volleyball games at UPT SDN Mangasa Makassar. In other words, the better the hand-eye coordination, the better the underhand passing ability.

c. The Relationship between Arm Muscle Strength, Hand-Eye Coordination, and Underhand Passing on the Underhand Passing Ability of Students at Mangasa Elementary School, Makassar.

The fourth hypothesis tested in this study is that there is a relationship between arm muscle strength and hand-eye coordination on the underhand passing ability of students at Mangasa Elementary School, Makassar. Based on the results of a survey conducted at Mangasa Elementary School, Makassar, the data from the multiple correlation analysis related to underhand passing performance are presented in the following table:

Table 4. Hypothesis Three: There is a relationship between arm muscle strength, hand-eye coordination, and underhand passing on the underhand passing ability.

correlation	N	R	R^2	P_{value}	Significant
X_1.X_2. Y	30	0,795	0,604	0,000	Description

Nilai F_{hitung} yang diperoleh sebesar 23.123 dan nilai F_{tabel} pada α=0,05 adalah 4.17. Nilai $F_{hitung} > F_{tabel}$ sehingga dapat disimpulkan bahwa koefisien korelasi antara kekuatan lengan dan koordinasi mata tangan secara bersama-sama dengan kemampuan passing bawah pada permainan bola voli murid UPT SDN Monginsidi III Makassar yang memiliki koefisien korelasi ($R_{x.1.2.3.y}$) = 0.795 adalah signifikan. Dengan koefisien korelasi tersebut, dapat diketahui koefisien determinasinya dari R Square = 0.795 (79.50%). Ini berarti, kontribusi kemampuan passing bawah pada permainan bola voli murid UPT SDN Monginsidi III Makassar dapat dijelaskan oleh kekuatan lengan dan koordinasi mata tangan sebesar 79.50%.

From the results of the hypothesis testing which shows a simultaneous contribution between arm strength and hand-eye coordination with the ability to pass underhand in volleyball games of students at SDN Mangasa Makassar. Based on the calculation results obtained a correlation coefficient value of 0.795 which is explained through the regression equation $\hat{Y}$ = -2.511 + 0.415 X1 + 0.589 X2 This result further strengthens the results of the single hypothesis testing. Thus, arm strength and hand-eye coordination can be good predictors for the ability to pass underhand in volleyball games of students at SDN Mangasa Makassar. This means, if arm strength and hand-eye coordination are categorized as good, then it can be ascertained that the ability to pass underhand in volleyball games will be better.

CONCLUSSION

Assin Based on the data Analysis and Discussion, the Results of This Study can be Concluded as Follows :

1. Arm strength contributes to underhand passing in volleyball.
2. Hand-eye coordination contributes to underhand passing ability in volleyball.
3. Arm strength and hand-eye coordination contribute to underhand passing ability in volleyball.

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