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Contribution Of Arm Muscle Strength, Arm Muscle Explosive Power And Balance To The Bullets Reject Ability In Junior High School Students

M. Imran Hasanuddin[1*], Hasyim[2]

[1,2]Jurusan Pendidikan Jasmani Kesehatan dan Rekreasi, Universitas Negeri Makassar, Jl. AP. Pettarani Makassar, Sulawesi Selatan, 90221Indonesia

*e-mail: m.imran.hasanuddin@unm.ac.id

Info Artikel

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Abstrak

This study aims to determine; 1) is there a contribution between arm strength and the ability to shoot sideways style on SMP Negeri 19 Makassar students. 2). Is there a contribution between the explosive power of the arm muscles and the ability to shoot a sideways style shot at SMP Negeri 19 Makassar. 3). Is there a contribution between the balance and the ability to shoot sideways style on students of SMP Negeri 19 Makassar. 4) Is there a contribution between arm muscle strength, arm muscle explosive power and balance together on the sideways force shot put ability of SMP Negeri 19 Makassar students. The method used in this research is a quantitative descriptive method. The population in this study were all students at SMP Negeri 19 Makassar, totaling 115 students. The sample in this study amounted to 43 students. The sampling technique used simple random sampling (randomly). Based on the results of data analysis and hypothesis testing, it can be concluded as follows: 1) There is a significant contribution between arm muscle strength variables on the sideways force shot put ability of students of SMP Negeri 19 Makassar, amounting to 33.7% with an R value of 0.580 (Pvalue = 0.000 <α 0.05). 2) There is a significant contribution between the variable explosive power of the arm muscles to the ability to shoot sideways style bullets at SMP Negeri 19 Makassar, amounting to 65.2% with an R value of 0.807 (Pvalue = 0.000 <α 0.05). 3) There is a significant contribution between the balance variable on the sideways force shot-put ability of SMP Negeri 19 Makassar students, amounting to 22.2% with an R value of 0.471 (Pvalue = 0.001 <α 0.05). 4) There is a significant contribution between the variables of arm muscle strength, arm muscle explosive power and balance together on the sideways force shot put ability of students of SMP Negeri 19 Makassar, amounting to 75.5% with an R value of 0.869 (Pvalue = 0.000< α 0.05); and Fcount value of 40.124.

INTRODUCTION

The development of sports in Indonesia today feels increasingly advanced, this cannot be separated from the participation of the public who are increasingly aware and understand the importance and function of sport itself, in addition to the attention and support of the government. The importance of coaching also supports the development of sports in Indonesia as stated in Law Number 3 of 2005 concerning the Sports System. National which explains that "The national sports system is a whole sports subsystem that is interconnected in a planned, integrated and sustainable manner to achieve national sports goals (bagia, 2020).

The sport of athletics consists of several numbers, one of which is the throwing number. This number has its own characteristics, namely that the bullet is not thrown but is pushed or pushed with one hand. Getting good shot put results is determined by the correct technique. Some of these factors are internal, for example; talent, emotions, mood, motivation and others. Meanwhile, external factors include; trainers, facilities and infrastructure, environmental and socio-cultural factors. These athletic throwing numbers are: Discus Throw, Javelin Throw, Hammer Throw and Shot Put. Shot put is one of the throwing events that uses its energy by pushing or repelling a bullet rather than throwing it. The aim of shot put is to be able to push a bullet the furthest distance using the correct techniques. So to fulfill the correct technique, it is necessary to learn the basic techniques in shot put, namely: Grip, Start, Push and Final position after the shot. Shot put is divided into two types of styles, namely: Orthodox style (sideways style) and O'Brien style (back-to-back style) (Hasanuddin, 2018).

Discus throwing is one of the competition events in athletics that uses a wooden object in the shape of a plate with an iron belt, or other material that is round and flat which is thrown. In learning discus throwing in junior high schools (SMP), a teacher can use, utilize, develop or even modify the tools that will be used. There are several physical condition factors that can influence a person's skills in a sport, such as discus throwing, namely endurance, speed, strength, agility, flexibility, and accuracy. , balance (balance), explosive power (power), and coordination (bagia, 2020).

Shot put is a type of skill in pushing an object in the form of a bullet as far as possible. "The goal of shot put is to achieve a push as far as possible," (Yudha M. Saputra, 2001:73). As the name suggests, a push is not a throw, this tool is pushed or pushed with one hand, starting from placing it at the base of the shoulder. This means that students whose body posture is large have the opportunity to throw the bullet well. throwing, besides strength (Kuryanto, 2015).

In this regard, Yudha M. Saputra (2001:73) stated that achieving shot put results requires coordination, dexterity and precise timing, speed, throwing, in addition to strength. Meanwhile, Engkos Kosasih (1993:54) stated that the shot put number requires basic physical elements, namely the leg muscles and arm muscles must be strong, flexible and have muscle strength. In (Utami, 2013) states that strength, explosive power, speed, flexibility,

agility, dexterity, coordination, relaxation and balance have an influence on shot put results.

Currently both techniques are being used by the top throwers in the world. Competitive performance in shot put in track and field can be characterized as a very aggressive display of strength, power, and technique. The shot put event in track and field uses a technical pattern that attempts to create a buildup of force by creating torque between different parts. the body through stretch reflexes. For this reason, it is very important that the body is optimally adapted to performing these techniques. Given the explosive nature of throwing events and the precise sequence of contractions that must occur, training routines are designed to emphasize strength and flexibility (Brein, 2019).

If you look at the movement characteristics of the shot put sport, where the movement is carried out by the arms, then the pelvis, of course both parts of the body must be in good condition. When pushing the shot put, the arm movements must be strong and fast, this is a characteristic of the explosive power component of the arm muscles. Muscle explosive power is the maximum work performed by a muscle or group of muscles to produce a certain speed (Permana et al., 2021). Flexibility is one of the physical components that every person has to create flexible, fluid and not stiff movements, so this element of physical condition is developed into movement abilities that support the mastery of sports skills.

There are two ways of starting that can be done, namely starting sideways and starting backwards or backwards or sideways style. For elementary school students, the backward prefix technique can be given with the consideration that this prefix technique is known first. As for several known factors involved in athletics, the most important thing for shot put is strength and speed, because if the arm is not strong, it will not be able to reject the bullet quickly. For this reason, it is necessary to train for strength and speed (explosive power).

In connection with the importance of this problem, it can be concluded that the shot put results are influenced, among other things, by the explosive power of the arm muscles and the strength of the arm muscles. However, this opinion needs to be studied further so that it is known for certain how big the relationship between these elements is. So researchers will conduct research on shot put, especially side shot shot put and factors that influence shot put results, such as arm muscle explosive power and arm muscle strength.

METHODS

This type of research is descriptive quantitative. According to Arikunto (2013:3), what is meant by descriptive research is research intended to investigate circumstances, conditions or other things that have been mentioned and the results are presented in the form of a research report. Research conducted. involving independent variables, namely arm strength (X1), arm explosive power (X2), balance (X3) on the dependent variable, namely sideways force shot put ability (Y).

Population is a generalization area consisting of objects that have certain qualities and characteristics that are applied by researchers to study and then draw conclusions (Sugiyono, 2012). The population in this study were all students at SMP Negeri 19 Makassar, totaling 115 students. According to Arikunto (2013), the sample is a portion or representative of the population studied. The sample in this study was 43 students. The sampling technique uses simple random sampling (randomly).

The research instruments used include the following;

1. Instrument for taking data on arm muscle strength (upper body), namely by measuring using the push up test.
2. The instrument for collecting data on arm muscle explosive power is by using the seated Medicine Ball Throw test.
3. The instrument for taking balance data is by using the Modified Bass Test of Dynamic Balance test.
4. Instrument to collect data on shot put ability by means of a shot put test.

The data analysis technique used is descriptive and inferential statistical analysis. Descriptive statistics are intended to get a general picture of research data. Inferential statistics to test research hypotheses with correlation and regression. processed and statistically analyzed with the help of a computer using the SPSS version 25 program at a significance level of $\alpha=0.05$ (95%).

FINDINGS AND DISCUSSION

Findings

The results of observations in the field as the first step of research, teachers in the field need a form of basketball skills test with clear technical instruments, as material for measuring and evaluating basketball skill techniques performed by students. In reality, in the field, teachers only carry out basketball skills tests which do not yet have clear benchmarks and the quality is not yet known. By not knowing clear references and benchmarks, students carry out passing, dribbling and shooting skills with their own perceptions, then look at the literature as well. There has not been a discussion about the validity and objectivity of basketball skills tests so that the tests carried out so far on the field are felt to be less effective and not on target if carried out.

Descriptive analysis carried out for arm strength, arm explosive power and balance on lateral force shot put ability of students at SMP Negeri 19 Makassar, can be seen in the table as follows

Table 1. Summary of Descriptive Analysis Results of Research Variables

Statistik	Arm strength	Arm explosive power	Balance	Shot put
N	43	43	43	43
Mean	15.93	3.8695	57.9070	5.5386
Std. Deviation	4.458	.710	17.121	1.589
Variance	19.876	.505	293.134	2.526
Range	18	3.27	60	5.71
Minimum	7	2.00	30	3.15
Maximum	25	5.27	90	8.86

Based on the table above, it can be explained as follows:

1) Arm strength, obtained an average value (mean) = 15.93, standard deviation (standard deviation) = 4.458, lowest (minimum) value = 7, and highest (maximum) value = 25.
2) Arm explosive power, obtained an average value (mean) = 3.8695, standard deviation (standard deviation) = 0.710, lowest (minimum) value = 2.00, and highest (maximum) value = 25.27.
3) Balance, obtained average value (mean) = 57.9070, standard deviation (standard deviation) = 17.121, lowest (minimum) value = 30, and highest (maximum) value = 90.
4) Balance, obtained average value (mean) = 5.5386, standard deviation (standard deviation) = 1.589, lowest (minimum) value = 3.15, and highest (maximum) value = 8.86.

Normality Test One of the assumptions that must be met so that parametric statistics can be used in research is that the data must follow a normal distribution. To determine the distribution of arm strength, arm explosive power and balance on the lateral force shot put ability of students at SMP Negeri 19 Makassar, a data normality test was carried out using Kolmogorov-Smirnov. The results of the data normality analysis can be seen in the following table;

Table 2. Summary of Data Normality Test Results

	Kolmogorov-Smirnov		
	Statistik	df	Signifikan
Arm strength	0.118	43	0.153
Arm explosive power	0.069	43	0.200
Balance	0.120	43	0.132
Shot put	0,105	43	0,200

Based on the table above, it shows that the results of data normality testing using the Kolmogorov-Smirnov test show the following results:

1) Data from the arm strength test, obtained a calculated Kolmogorov-Smirnov value of 0.118 (P= 0.153 > α 0.05), so it can be said that the data studied follows a normal distribution or normal distribution.
2) For arm explosive power test data, the calculated Kolmogorov-Smirnov value was 0.069 (P= 0.200 > α 0.05), so it can be said that the test data that has been studied follows a normal distribution or normal distribution.
3) For the balance test data, the calculated Kolmogorov-Smirnov value was 0.120 (P= 0.132 > α 0.05), so it can be said that the test data that has been studied follows a normal distribution or normal distribution.
4) Data from the shot put ability test, obtained a calculated Kolmogorov-Smirnov value of 0.105 (P= 0.200 > α 0.05), so it can be said that the test data that has been studied follows a normal distribution or normal distribution.

The correlation coefficient shows the relationship between the independent variables (arm strength, arm explosive power and balance) and the dependent variable (lateral force shot put ability). The Pearson correlation calculation for the analyzed variables must be carried out, because basically for analysis using regression it must be checked first. first the correlation was large. Based on the results of the person correlation analysis and multiple regression tests, the Pearson correlation values obtained for variables include the following;

Table 3. Summary of correlation analysis resul

No	Variabel	r	P	Information
1	Arm strength (X1) against lateral force shot put ability (Y)	0.580	0,000	Signifikan
2	Arm explosive power (X2) versus sideways force shot put ability (Y)	0.807	0,000	Signifikan
3	Balance (X3) against sideways force shot put ability (Y)	0.471	0,001	Signifikan

Based on this table, which is a summary of the results of data correlation analysis for each research variable, it can be described as follows;

1. The correlation between variable Y (side shot shooting ability) and variable X1 (arm strength) obtained a value of 0.580 and a sig value of 0.000. These results indicate that there is a correlation between variable Y (dribbling ability) and variable X1 (arm strength), which is indicated by a sig (p) value < 0.05.

2. The correlation between variable Y (side-style shot put ability) and variable X2 (arm explosive power) obtained a value of 0.807 and a sig value of 0.000. These results indicate that there is a correlation between variable Y (lateral force shot put ability) and variable X2 (arm explosive power), which is indicated by a sig (p) value < 0.05.
3. The correlation between variable Y (side-style shot put ability) and variable X3 (balance) obtained a value of 0.471 and a sig value of 0.001. These results indicate that there is a correlation between variable Y (side-style shot put ability) and variable X3 (balance), which is indicated by a sig (p) value < 0.05.

The results of the multiple regression analysis were to determine the magnitude of the regression or correlation simultaneously between arm strength, arm explosive power and balance on the lateral force shot put ability of students at SMP Negeri 19 Makassar, a multiple regression analysis was carried out as follows;

Table 4. Summary of regression analysis results

Variabel	R	R^2	F	P_{value}	Ket
Kekuatan lengan (X1) Daya ledak lengan (X2) Keseimbangan (X3) Kemampuan tolak peluru (Y)	0,869	0,755	40.124	0,000	Sig

Based on the table above, it can be seen that the results of the multiple regression calculations, obtained a calculated correlation value, meaning that there is a significant correlation between arm strength, arm explosive power and balance on the lateral force shot put ability of students at SMP Negeri 19 Makassar, namely (R) = 0.869 (P< α 0.05) with a coefficient of determination (R2) = 0.755 or 75.5%, after carrying out a significance test using the F test, Fcount = 40.124 (Pvalue= 0.000< 0.05). Thus, if a student has good arm strength, arm explosive power and balance, this will also be followed by better and maximum lateral force shot put ability.

There are four hypotheses that will be proposed in this research. The four hypotheses must be tested for truth through empirical data. After testing using correlation and multiple regression tests (parametric statistics), the following results were obtained:

1. There is a correlation between arm strength and sideways shot put ability among students at SMP Negeri 19 Makassar.

   Ho : r x1.y = 0

   H1 : r x1 y ≠ 0

   Test results

   The results of data analysis obtained a calculated correlation value (r) = 0.580 (P < α 0.05), so Ho was rejected and H1 was accepted,

meaning there was a significant correlation between arm strength and sideways shot put in students at SMP Negeri 19 Makassar.

2. There is a contribution between the explosive power of the arm and the ability to throw bullets with sideways force in students at SMP Negeri 19 Makassar.

   Ho : r x2.y = 0

   H1 : r x2 y ≠ 0

   The results of data analysis obtained a calculated correlation value (r) = 0.807 (P < α 0.05), so Ho was rejected and H1 was accepted, meaning that there was a significant correlation between arm strength and sideways shot put in students at SMP Negeri 19 Makassar.

3. There is a contribution between balance and the sideways shot put ability of students at SMP Negeri 19 Makassar.

   Ho : r x2.y = 0

   H1 : r x2 y ≠ 0

   Test results

   The results of data analysis obtained a calculated correlation value (r) = 0.471 (P < α 0.05), so Ho was rejected and H1 was accepted, thus meaning that there was a significant balance of correlation to the lateral force shot put ability of students at SMP Negeri 19 Makassar.

4. There is a joint correlation between arm strength, arm explosive power and balance on the lateral force shot put ability of students at SMP Negeri 19 Makassar.

   Ho : R x1,2,3.y = 0

   H1 : R x1,2,3.y ≠ 0

   The results of data analysis obtained a calculated correlation value (R) = 0.869 (P < α 0.05), so Ho was rejected and H1 was accepted, meaning that there was a significant correlation between arm strength, arm explosive power and balance together on repulsion ability. sideways force bullets on students at SMP Negeri 19 Makassar. From the results of multiple regression data analysis, the calculated R value (Ro) was obtained = 0.869, with F obtained = 40.124 (Pvalue= 0.000 < 0.05). So H0 is rejected and H1 is accepted. This means that there is a significant correlation between arm strength, arm explosive power and balance together with the lateral force shot put ability of students at SMP Negeri 19 Makassar. The value of the coefficient of determination (R2) obtained = 0.755, this means that 75.5% of the lateral force shot put ability is explained by arm strength, arm explosive power and balance, while the remaining 24.5% is explained by other variables not observed in the study This. This means that, if students have arm strength, arm explosive power and good balance, this will be followed by good lateral force shot put ability in students at SMP Negeri 19 Makassar.

Discussion

Based on the hypothesis proposed in this research and from research data that has carried out statistical tests between the variables of arm strength, arm explosive power and balance as independent variables on sideways shot put ability as the dependent variable, it can be stated that the results of the research discussion these are as follows:

1. Results of the first hypothesis test; There is a significant correlation between arm strength and sideways shot put ability in students at

SMP Negeri 19 Makassar. Judging from the results of data analysis, it is obtained that R=0.580 and there is a significant correlation of 33.7%. If the results of this research are linked to the underlying theories and framework of thought, then basically the results of this research support and strengthen existing previous research. Where a sportsman's good arm strength will support his sideways shot put ability.

2. Results of the second hypothesis test; There is a significant correlation between arm explosive power and lateral force shot put ability among students at SMP Negeri 19 Makassar. Judging from the results of data analysis, it is obtained that R=0.807 and there is a significant correlation of 65.2%. If the results of this research are linked to the underlying theories and framework of thought, then basically the results of this research support and strengthen existing previous research. Where good arm explosive power will support the ability to throw bullets with sideways force.
3. Third hypothesis test results; There is a significant correlation between balance and sideways shot put ability in students at SMP Negeri 19 Makassar. Judging from the results of data analysis, it is obtained that R=0.471 and there is a significant correlation of 22.2%. If the results of this research are linked to the underlying theories and framework of thought, then basically the results of this research support and strengthen existing previous research. Where good balance will support the ability to shoot sideways shots.
4. Results of the fourth hypothesis test; There is a significant correlation between arm strength, arm explosive power and balance on the lateral force shot put ability of students at SMP Negeri 19 Makassar. Judging from the results of data analysis, it is obtained that R=0.869 and there is a significant correlation of 75.5%. If the results of this research are linked to the underlying theories and framework of thought, then basically the results of this research support and strengthen existing previous research. Where arm strength, explosive arm power and good balance of an athlete will support the ability of a sideways shot put.

CONCLUSIONS

Based on the results of data analysis and discussion, the results of this research can be concluded as follows: (1) There is a significant contribution between the arm muscle strength variable on the side-style shot put ability of students at SMP Negeri 19 Makassar, amounting to 33.7% with an R value of 33.7%. 0.580 (Pvalue= 0.000<α 0.05). (2) There is a significant contribution between the arm muscle explosive power variable on the lateral force shot put ability of students at SMP Negeri 19 Makassar, amounting to 65.2% with an R value of 0.807 (Pvalue= 0.000<α 0.05). (3) There is a significant contribution between the balance variables on the lateral force shot put ability of students at SMP Negeri 19 Makassar, amounting to 22.2% with an R value of 0.471 (Pvalue= 0.001<α 0.05). (4) There is a

significant contribution between the variables of arm muscle strength, arm muscle explosive power and balance together to the lateral force shot put ability of students at SMP Negeri 19 Makassar, amounting to 75.5% with an R value of 0.869 (Pvalue= 0.000 <α 0.05); and the Fcount value is 40.124. The suggestions in this research include; Students who have arm strength, explosive arm power and good balance are expected to further improve their abilities in the sport of shot put. Sports teachers are expected to be more observant in seeing the talents and potential of their students, so that they can develop these talents as early as possible. This research can be used as additional insight into knowledge regarding the development of sports material, especially shot put.

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