The Influence Of Drill And Power Arm Training On Lob And Smash Results In Beginners Athletes PB Kaisar Tegal

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Article Info

Abstract

This research aims to determine: 1) Whether or not there is an influence of the drill method and arm power on the accuracy of the lob shot. (2) Whether or not there is an influence of drill and arm power training methods on the accuracy of smash hits. (3) Whether there is a difference in the influence of mixed drill and separate drill training methods on the accuracy of lob and smash shots.(4) Whether there is a difference in the influence of athletes who have high arm power and low arm power on the accuracy of lob and smash shots. (5) Whether or not there is a significant interaction between drill training and arm power on the accuracy of lob and smash shots. This research uses a 2 x 2 factorial design.The sample consisted of 20 athletes, the sampling technique used probability sampling, the subjects had been determined, namely 12-15 years old (beginners). The arm muscle power instrument uses the Overhead Medicine Ball Throw test (Widiastuti, 2017: 123) to group subjects and the lob and smash accuracy test instrument uses theory (Frank M. Verducci in Sapta Kunta Purnama, 2010). The data analysis technique used is MANCOVA two track.

Research results: (1) There is an influence of drill and arm power training methods on the accuracy of lob shots. Athletes who have high arm power are better trained using mixed drill methods, while athletes who have low arm power are better trained using separate drills. (2) There is an influence of drill training methods and arm power on the accuracy of smash shots. Athletes who have high arm power are better trained using mixed drill methods, while athletes who have low arm power are better trained using separate drills.(3) There is a difference in the influence of mixed drill and separate drill training methods, the significance value is 0.000 < 0.5. This means that there is a significant difference in the influence of the mixed drilling training method and the separate drilling training method. (4) There is a difference in the influence of athletes who have high arm power and low arm power with a significance value of 0.000 < 0.5. This means that there is a significant difference in the influence of athletes who have high arm power and low arm power.(5) There is a significant interaction between drill training and arm power on the accuracy of lob and smash shots, significance value 0.000 < 0.5. This means that there is an interaction between the drill method and arm power on the accuracy of lob and smash shots by novice athletes at PB Kaisar Tegal, which has been proven.

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INTRODUCTION

The game of badminton is one of the sports that is liked by the Indonesian people because it is a sport that can make Indonesia a champion on the world stage. By making the sport of badminton popular, efforts to achieve badminton achievements must continue to be encouraged and improved to maintain and improve what has been achieved so that it can make Indonesia proud. Badminton is a racket sport played by two people (singles) or two pairs (doubles) using equipment in the form of rackets on a field divided by a net with high intensity and short duration (Aksan, 2012; Seth, 2016; and Zulbahri & Melinda, 2019).

The development of Indonesian badminton can make a real contribution to the economic, social, political and cultural world. Badminton will continue to develop into a sporting phenomenon that has succeeded in attracting people's attention for various purposes or interests, perhaps to improve fitness, fulfill entertainment needs, improve performance and meet financial and other needs. This development was influenced by players, coaches and badminton fans who cannot be separated from their perseverance and loyalty to advance badminton in Indonesia.

As a badminton athlete, you must be able to master the basic techniques of badminton hitting skills, as stated by Sapta Kunta Purnama (2010:15) that "The basic techniques of badminton skills that badminton players need to master are long serve, short serve, lob, semes, drop shot, drive and netting". Lobs and smashes are basic badminton techniques that are very important for badminton athletes with the aim of supporting the athlete's own game. Lob (overhead clear) badminton is a type of badminton shot which is done by hitting the ball straight, high and far behind the opponent's playing field and is also a blow which is aimed as a pattern of defense and attack (Hetti R.A, 2010; Ismi Tashilatun Ni"mah & Mateus Deli, 2017; Feri Andrian Ariyanto, 2021).

Apart from the lob, there is also a very important shot in badminton, namely the smash. This is in accordance with the opinion of Helal El Gizawy and Abdel Rahman (2014:49) who state that "smash in a badminton game is an important shot used as an offensive starting point". A smash is an overhead (above the head) punch aimed down the opponent's court area which is done with full force or hard. The smash is also a very powerful weapon for collecting points in a badminton match, because the ball falls in the opponent's playing area fast and sharp. (Fekum Ariesbowo Werdihartohadi, 2011; James Poole, 2016). This opinion is the same as that

expressed by Zao Zhang et.al (2016:9-10), namely "In the stroke, the shuttle is hit toward the opponent's court with high speed and at a steep downward angle" which can be interpreted as the player hitting the ball as quickly as possible to get numbers or points so that good and quality smashing skills are very necessary to score points. Likewise, Hassan (2017) believes "smashing performance is one of the most relevant key successes to score critical points in badminton matches".

Lobs and smashes are basic badminton techniques that are very important for badminton athletes with the aim of supporting the athlete's own game. Lob (overhead clear) badminton is a type of badminton shot which is done by hitting the ball straight, high and far behind the opponent's playing field and is also a blow which is aimed as a pattern of defense and attack (Hetti R.A, 2010; Ismi Tashilatun Ni"mah & Mateus Deli, 2017; Feri Andrian Ariyanto, 2021).

Apart from the lob, there is also a very important shot that influences the quality of badminton, namely the smash. According to Helal El Gizawy and Abdel Rahman (2014:49) who stated that "smash in a badminton game is an important shot used as an offensive starting point". A smash is an overhead (above the head) punch aimed down the opponent's court area which is done with full force or hard. The smash is also a very powerful weapon for collecting points in a badminton match, because the ball falls in the opponent's playing area fast and sharp. (Fekum Ariesbowo Werdihartohadi, 2011; James Poole, 2016). Lob and smash skills are equally important strokes in badminton. Therefore, badminton athletes must master these skills to support the quality of their game. Lob and smash skills are equally important strokes in badminton. Therefore, badminton athletes must master these skills to support the quality of their game.

Exercises that can improve these two strokes can use the drill training method as stated by Pradana Akwila Febri (2016). Drill training is training that focuses on one material and focuses on repetition. The purpose of drill training is to practice the necessary techniques and develop motor and neuromuscular habits.

Based on the theory described above, the author arose the idea of researching the level of performance in lob and smash shots using the drill method. It is hoped that this research can provide evidence about the efficiency of the training methods used to train hitting skills and can provide the right portion of training at a beginner's age so that

athletes do not experience a decline in performance or even find it difficult to improve their performance at the next level.

METHODS

Research methods are the methods used by researchers to collect research data to obtain results of a problem in research. Researchers must be able to choose and determine the right method to achieve their research objectives, Saifuddin Azwar (2016: 19). So it is hoped that the methodology must be appropriate and lead to the expected goals and be scientifically accountable.

This research method is a true experimental method (tru-experimental research). According to Sumadi Suryabrata (2013: 88), the aim of real experimental research is to investigate possible causal relationships by applying one or more treatment conditions and comparing the results with one or more groups. The author's reason for choosing this method is that by looking at the variables that will be studied, treating the subject with the hope of change, or in other words, providing treatment with the training given, a cause and effect relationship will be seen from the influence of the implementation of the training.

Furthermore, by paying attention to the description above, it can be concluded that the basis for using the experimental method is experimental activities which include an initial test (pretest), providing treatment (treatment) and ending with a final test (posttest), to test the truth that can be scientifically justified. The experiment in this research used a factorial design with a 2 x 2 factorial design, namely a factorial experiment involving two factors. In this study, treatment was carried out 14 times using mixed lob smash drill and separate lob smash drill training methods.

The division of experimental groups was based on the initial ability of the arm power test using the overhead medicine ball throw test. After the initial test results were obtained, the researchers determined the subject groups by dividing four balanced groups between athletes who had good, enough, less, very less arm strength and were paired into one group.

In this way, the four groups before being given treatment had become balanced groups. If in the end there is a difference, then this is due to the influence of the treatment given.In this design, an initial measurement (pretest) is used, then subjected to treatment (Treatment) for a certain period of time, then the measurement is carried out again (Posttest), (Sumadi Suryabrata 2013:101). In this study, the treatment time was 14 meetings.

In the implementation, the subjects were given a power test, namely using a test using a 2 kg medicine ball to divide the treatment groups. The lob and smash test before being given treatment is called a preetest to get a score on the ability of the lob and smash results.

After that, they were divided into balanced groups between groups A-B-C-D, then the treatment was carried out by group A (high power group practicing mixed drill lob and smash methods), group B (high power group practicing separate drill lob and smash methods), C (Group low power training using mixed drill lob and smash methods), and D (Low power group training using separate drill lob and smash methods). During 14 meetings and the last one is the post test which will be the data from the experiment where the results of the accuracy of PB Kaisar Tegal athletes' lobs and smashes increased or there was no change at all.

Subjects were given a power test, namely using a test using a 2 kg medicine ball to divide the treatment groups. The lob and smash test before being given treatment is called a preetest to get a score on the ability of the lob and smash results. After that, they were divided into balanced groups between groups A-B-C-D, then the treatment was carried out by group A (high power group practicing mixed drill lob and smash methods), group B (high power group practicing separate drill lob and smash methods), C (Group low power training using mixed drill lob and smash methods), and D (Low power group training using separate drill lob and smash methods). During 14 meetings and the last one is the post test which will be the data from the experiment where the results of the accuracy of PB Kaisar Tegal athletes' lobs and smashes increased or there was no change at all.

According to Sumardi Suryabrata (2013: 143) Population is a group that is used as a research object. The population in this study were PB Kaisar Tegal athletes, totaling 30 people.

According to Saifuddin Azwar (2013: 79) The sample is part of the population, because it has the characteristics of the population. Basically, the sampling technique in this research is probability sampling, each subject in the population must have a known chance of becoming a sample. The researcher determined a sample of 20 athletes because the population of PB Kaisar Tegal Regency players was 30, therefore the researcher determined a sample of 20 athletes aged 12-15 years.

According to Sumardi Suryabrata (2013: 28) Independent variables are variables that researchers choose deliberately (according to plan) to study their influence on the dependent variable. The manipulative independent variable is the training method which consists of two methods, namely: the mixed drill lob smash training method and the separate drill lob smash training method. The attribute variables in this research are: high arm power and low arm power. Meanwhile, the dependent variable is the variable that is influenced by the independent variable. The dependent variable in this research is the accuracy of lob and smash

shots.

RESULTS AND DISCUSSION

In this study, the sample was determined through the overhead medicine ball throw test by determining the strength of the arm muscles to group them into 4 groups equally.

The following is the data on the Overhead Medicine Ball Throw test results:

Name	Farthest Throw	Ket	Rk
Tananta Dondia A.	6,86m	Enough	3
Viky Adinurahman	7,02m	Enough	1
Arshaka Faustin	5,65m	Enough	10
Dede A. Mudhofar	6,70m	Enough	6
Dava A Ernandi	5,58m	Enough	12
M.Azim Fikri	6,96m	Enough	2
M. Rizki R	4,15m	Not Enough	18
Riko Setia Budi	4,84m	Not Enough	15
M. Syabani	5,59m	Enough	11
Adam R. A	6,84m	Enough	4
Althafio Malazi	5,80m	Enough	9
Gandhi Raytama	4,40m	Not Enough	17
M. Abdillah P	4,42m	Not Enough	16
M. Xavi Syafix	6,76m	Enough	5
Zhein F Mutaqin	3,85m	Not Enough	20
Nathan A Zafran	4,10m	Not Enough	19
Riana Wahyu W	6,46m	Enough	7
Wiwin Zaenal	4,88m	Not Enough	14
Rachuel Khanza	6,40m	Enough	8
Selgi Nur Syahbani	5,12m	Enough	13

Table 4.2 Results of Arm Power Measurement Using the Medicine Ball Test

The sample was divided into two groups, group A was the experimental group, athletes who had high arm muscle power were given mixed lob smash drill training, while group B was the experimental group, athletes who had low arm muscle power were given separate lob smash drill training. The results of grouping based on ordinal pairing are as follows:

High Arm Power Group (A1)	
Mixed Drill Lob Smash Training Method (B1)	Separate Drill Lob Smash Training Method (B2)
Viky Adinurahman (1)	M.Azim Fikri (2)
Rachuel Khanza (8)	Riana Wahyu W (7)
Althafio Malazi (9)	Arshaka Faustin (10)
M. Abdillah Pratama(16)	Riko Setia Budi (15)
Gandhi Raytama (17)	M. Rizki R (18)
Low Arm Power Group(A2)	
Mixed Drill Lob Smash Training Method (B1)	Separate Drill Lob Smash Training Method (B2)
Tananta Dondia A P (3)	Adam R A (4)

Dede A. Mudhofar (6)	M. Xavi Syafix (5)
M. Syabani (11)	Dava A Ernandi (12)
Wiwin Zaenal (14)	Selgi Nur Syahbani(13)
Nathan A Zafran (19)	Zhein F Mutaqin (20)

Table 4.3 Grouping of Treatment Samples

Recapitulation results of preetest and posttest lob hitting accuracy:

High Arm Power Group (A1)			
Mixed Drill Lob Smash Training Method (A1B1)		Separate Drill Lob Smash Training Method (A1B2)	
Preetest	Posttest	Preetest	Posttest
22	31	19	28
20	25	21	25
17	25	18	24
14	23	15	20
13	22	15	20
Low Arm Power Group(A2)			
Mixed Drill Lob Smash Training Method (A2B1)		Separate Drill Lob Smash Training Method (A2B2)	
Preetest	Posttest	Preetest	Posttest
19	26	18	28
15	23	17	24
18	23	19	26
19	23	16	21
15	21	13	23

Table 4.9 Recapitulation of Pretest and Posttest Lob Shot Accuracy

Recapitulation of Pretest and Posttest Data on Smash Hit Accuracy

High Arm Power Group (A1)			
Mixed Drill Lob Smash Training Method (A1B1)		Separate Drill Lob Smash Training Method (A1B2)	
Preetest	Posttest	Preetest	Posttest
21	30	18	30
15	27	15	27
18	24	18	24
15	24	15	27
12	21	15	21
Low Arm Power Group(A2)			
Mixed Drill Lob Smash Training Method (A2B1)		Separate Drill Lob Smash Training Method (A2B2)	
Preetest	Posttest	Preetest	Posttest
21	24	18	27
18	27	15	27
12	24	15	21
15	21	12	27
15	24	12	21

Table 4.10 Recapitulation of Pretest and Posttest Smash Hit Accuracy

Research Data Analysis
a. Descriptive Analysis of Lob and Smash Shot Accuracy

Data analysis is a very important step in research activities to be able to find out the description of the data obtained in the research.

Descriptive data on the results of the pretest and posttest accuracy of lob and smash hits in PB Kaisar athletes from the results of data processing using the Multivariate Analysis of Cofariance test SPSS Version 25.0 For Windows.

Descriptive Statistics

	Drill Method	Arm Power	Mean	Std. Deviation	N
Posttes Lob	Mixture	High	25,20	3,493	5
		Low	23,20	1,789	5
		Total	24,20	2,821	10
	Separated	High	23,40	3,435	5
		Low	24,40	2,702	5
		Total	23,90	2,961	10
	Total	High	24,30	3,401	10
		Low	23,80	2,251	10
		Total	24,05	2,819	20
Posttest Smash	Mixture	High	25,20	3,421	5
		Low	24,60	3,286	5
		Total	24,90	3,178	10
	Separated	High	24,00	2,121	5
		Low	25,80	3,421	5
		Total	24,90	2,846	10
	Total	High	25,50	3,240	10
		Low	24,30	2,627	10
		Total	24,90	2,936	20

Table 4.11 Descriptive Data Results Using Multivariate Analysis of Cofariance

b. Normality Test of Lob and Smash Accuracy Results

The Normality Test is a test carried out with the aim of assessing the distribution of data in a group of data or variables, whether the data distribution is normally distributed or not. With the normality test criteria, the significance level is 5% or 0.05. The rules for normality testing using Multivariate Analysis of Cofariance are:

¬ If the sig value is > 0.05, then the test is declared to be normally distributed.

¬ If the sig value is <0.05, then the test is said to be not normally distributed.

Tests of Normality

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	Df	Sig.
Residual for PostTestLob	,120	20	,200*	,957	20	,492
Residual for PosttestSmash	,159	20	,200*	,905	20	,052

Table 4.12 Normality Test Results

Based on the statistical analysis of normality tests that have been carried out on lob and smash hit accuracy data obtained from the normality test

results with a sig value of 0.492 > 0.05 on the results of posttest residual data on lob hit accuracy, it can be concluded that this means the data is normally distributed. Meanwhile, in the posttest residual data results, the accuracy of the smash hit has a sig value of 0.052 > 0.05, which means the data is normally distributed.

c. Homogeneity Test

The homogeneity test is useful for assessing the similarity of samples, namely whether or not the variance of samples taken from the population is uniform. This homogeneity test uses the Multivariate Analysis of Cofariance test. The homogeneity rule uses the Multivariate Analysis of Cofariance (MANOVA) SPSS Version 25.0 For Windows test as follows:

¬ If the sig value is > 0.05, then the test is declared homogeneous.

¬ If the sig value is <0.05, then the test is said to be inhomogeneous.

Levene's Test of Equality of Error Variancesa

	F	df1	df2	Sig.
Posttes Lob	,764	3	16	,530
Posttest Smash	2,744	3	16	,077

Table 4.13 Homogeneity Test Results Using the Levene Test Method

Based on statistical analysis of homogeneity tests which have been carried out using the Levene's Test. In the homogeneity test table above, the sig value for the lob hitting accuracy posttest is 0.530 > 0.05 and the results for the smash hitting accuracy posttest are with a sig value of 0.77 > 0.05. This means that the data group has homogeneous variance. Thus, it can be concluded that the posttest data on the accuracy of lob and smash hits have the same variance or are homogeneous.

d. Hypothesis Testing

1.) The first hypothesis states "There is an influence of drill and arm power training methods on the results of the accuracy of lob shots for beginner athletes PB Kaisar".

Based on the results of the analysis, the data obtained in table 4.15 are as follows:

	Drill Method	Arm Power	Mean	Std. Deviation	N
Posttes Lob	Mixture	High	25,20	3,493	5
		Low	23,20	1,789	5
		Total	24,20	2,821	10
	Separated	High	23,40	3,435	5
		Low	24,40	2,702	5
		Total	23,90	2,961	10
	Total	High	24,30	3,401	10
		Low	23,80	2,251	10

		Total	24,05	2,819	20

Table 4.15 Results of differences in the influence of drill and arm power training methods on the accuracy of lob shots.

From the MANCOVA test results above, it can be seen that the difference in the mean value of the posttest results for lob hitting accuracy is as follows:
¬ Athletes who have high arm power trained using the mixed drill method get an average result (mean) of 25.20 with a standard deviation of 3.493.
¬ Athletes who have low arm power trained using the mixed drill method get an average result (mean) of 23.20 with a standard deviation of 1.789.
¬ Athletes who have high arm power trained using the separate drill method get an average result (mean) of 23.40 with a standard deviation of 3.435.
¬ Athletes who have low arm power trained using the separate drill method get an average result (mean) of 24.40 with a standard deviation of 2.702.
From the results of the explanation above, it can be interpreted that "Athletes who have high arm power are better trained using the mixed drill method, while athletes who have low arm power are better trained using separate drills."

2) The second hypothesis reads "There is an influence of the drill and arm power training methods on the results of the accuracy of smashes for beginner PB Kaisar athletes."
Based on the results of the analysis, the data obtained in table 4.16 are as follows:

	Drill Method	Arm Power	Mean	Std. Deviation	N
Posttest Smash	Mixture	High	25,20	3,421	5
		Low	24,60	3,286	5
		Total	24,90	3,178	10
	Separated	High	24,00	2,121	5
		Low	25,80	3,421	5
		Total	24,90	2,846	10
	Total	High	25,50	3,240	10
		Low	24,30	2,627	10
		Total	24,90	2,936	20

Table 4.16 Results of the differences in the influence of the drill training method and the arm power training method on smash accuracy results.

There is an influence of drill training and arm power on the results of smash accuracy as proven as follows:
¬ Athletes who have high arm power trained using the mixed drill method get an average result (mean) of 25.20 with a standard deviation of 3.421.
¬ Athletes who have low arm power trained using the mixed drill method get an average result (mean) of 24.60 with a standard deviation of 3.286.

¬ Athletes who have high arm power trained using the separate drill method get an average result (mean) of 24.00 with a standard deviation of 2.121.
¬ Athletes who have low arm power trained using the separate drill method get an average result (mean) of 25.80 with a standard deviation of 3.421.
From the results of the explanation above, it can be interpreted that "Athletes who have high arm power are better trained using the mixed drill method, while athletes who have low arm power are better trained using separate drills."

3) The third hypothesis states "There is a difference in the influence of mixed drill and separate drill training methods on the results of the accuracy of lob and smash shots for novice PB Kaisar athletes."
Based on the results of the analysis, the data obtained in table 4.17 are as follows:

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Mixed Drill Method	Posttes Lob	122,376	1	24,475	11,992	,000
	Posttest Smash	81,224[b]	1	16,245	2,754	,000
Split Drill Method	Posttes Lob	14,158	1	14,158	6,937	,000
	Posttest Smash	39,392	1	39,392	6,679	,000

Table 4.17 Differences in the influence of mixed drill training methods and separate drill methods.

From the MANCOVA test results in Table 4.17 above, it can be seen that the significance value is 0.000 < 0.5. means Ho is rejected. This shows that there is a significant difference in the influence of the mixed drill training method and the separate drill training method on the accuracy of lob and smash shots by novice athletes at PB Kaisar Tegal. This means that the research hypothesis which states that "there is a significant difference in the influence of drill and arm power training on the accuracy of lob and smash hits", has been proven.

4) The fourth hypothesis reads "There is a difference in the influence of athletes who have high arm power and low arm power on the results of the accuracy of lobs and smashes for novice PB Kaisar athletes."
Based on the results of the analysis, the data obtained in table 4.18 are as follows:

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
High Arm Power	Posttes Lob	,200	1	,200	,098	,000
	Posttest Smash	1,020	1	1,020	,173	,000
Low Arm Power	Posttes Lob	,263	1	,263	,129	,000
	Posttest Smash	1,631	1	1,631	,277	,000

Table 4.18 Differences in the influence of high arm

power and low arm power

From the MANCOVA test results in Table 4.18 above, it can be seen that the significance value is 0.000 < 0.5. means Ho is rejected. This shows that there is a significant difference in the influence of athletes who have high arm power and athletes who have high arm power on the accuracy of lob and smash shots by novice athletes at PB Kaisar Tegal. This means that the research hypothesis which states that "There is a significant difference in the influence of high arm power and low arm power on the accuracy of lob and smash hits", has been proven.

The fifth hypothesis states "There is a significant interaction between drill training and arm power on the results of the precision of lob and smash shots by novice PB Kaisar athletes".

Based on the results of the analysis, the data obtained in table 4.19 are as follows:

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
MetodeDrill * PowerLengan	Posttes Lob	24,169	1	24,169	11,842	,000
	Posttest Smash	,002	1	,002	,000	,000

Table 4.19 Interaction of Drill Method and Arm Power

From the MANCOVA test results in table 4.19 above, it can be seen that the significance value is 0.000 < 0.5. means Ho is rejected. This shows that there is an interaction between the drill method and arm power on the accuracy of lob and smash shots by novice athletes at PB Kaisar Tegal, which has been proven.

CONCLUSION

Based on the research results and the results of the data analysis that has been carried out, the following conclusions are obtained:
1) There is an influence of the drill and arm power training methods on the results of the accuracy of the lob punch of novice PB Kaisar athletes. Athletes who have high arm power are better trained using mixed drill methods, while athletes who have low arm power are better trained using separate drills.
2) There is an influence of the drill and arm power training methods on the results of the smash accuracy of PB Kaisar beginner athletes. Athletes who have high arm power are better trained using mixed drill methods, while athletes who have low arm power are better trained using separate drills.
3) There is a difference in the influence of mixed drill and separate drill training methods on the

results of the precision of lob and smash shots by novice PB Kaisar athletes. From the MANCOVA test results it can be concluded that the significance value is 0.000 <0.5. means Ho is rejected. This shows that there is a significant difference in the influence of the mixed drill training method and the separate drill training method on the accuracy of lob and smash shots by novice athletes at PB Kaisar Tegal. This means that the research hypothesis which states that "there is a significant difference in the influence of drill and arm power training on the accuracy of lob and smash hits", has been proven.
4) There is a difference in the influence of athletes who have high arm power and low arm power on the results of the accuracy of lob and smash shots by novice PB Kaisar athletes. From the MANCOVA test results it can be seen that the significance value is 0.000 <0.5. means Ho is rejected. This shows that there is a significant difference in the influence of athletes who have high arm power and athletes who have high arm power on the accuracy of lob and smash shots by novice athletes at PB Kaisar Tegal. This means that the research hypothesis which states that "There is a significant difference in the influence of high arm power and low arm power on the accuracy of lob and smash hits", has been proven.
5) There is a significant interaction between drill training and arm power on the results of the precision of lob and smash shots for novice PB Kaisar athletes. "From the results of the MANCOVA test of the interaction of drill training and arm power, it can be seen that the significance value is 0.000 < 0.5. means Ho is rejected. This shows that there is an interaction between the drill method and arm power on the accuracy of lob and smash shots by novice athletes at PB Kaisar Tegal, which has been proven.

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