

The Influence of Training Methods and Arm Muscle Strength Towards Volleyball Smash at Youth and Sports Department of Kendal (Dissporsa)

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Abstract

The background of the research is to know the difference between the hanging ball training method and the rubber band at the Dissporsa volleyball club. The aims of this study were: 1) to analyze the effect of the hanging ball and rubber rope method on volleyball smashes and 2) to analyze the effect of high and low arm muscle strength on volleyball smashes. 3) To find out the interaction between training methods and arm muscle strength on volleyball smash hits. This research method was a factorial design experiment of 2 x 2. The factorial design involved two factors as independent variables, namely the exercise method and arm muscle strength. The population of the study was 24 people who were members at Dissporsa Kendal volleyball club. Data analysis used a two-way ANAVA hypothesis test. The results of the research obtained by the Ball Group hung by 16,583 points of smash results better than the rubber rope group which was 7,750 points of smash results. The high arm muscle strength group of 15,250 points of smash results was better than the low arm muscle strength group of 9,083 smash points. The conclusion of the hanging ball training method has a much better smash. High arm muscle strength has a much better smash result. There is an interaction between the hanging ball method and arm muscle strength on smash results and there is an interaction between rubber rope training and arm muscle strength against smash hits at the Dissporsa Kendal volleyball club.

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INTRODUCTION

Sports is a popular physical activity for all ages such as children, and adolescents either men or women (Abidin, Darmawan, & Bujang, 2020). Nowadays, public enthusiasm for sport shows an increase as can be seen by many people doing sports activities in the morning and afternoon, especially on their days off. Sports, especially sports achievement, is one of the fields that must be considered at the current growth because it can increase and improve the nation pride at the international level.

Law number 3 of 2005 article 1 paragraph 13 related to National Sports System explains that "Sport achievement is a sport that promotes and develops athletes in a planned, tiered and sustained way by joining the competition to gain achievement by using scientific knowledge and sports technology" (Sahabuddin, 2020).

Achievement in sports cannot be achieved quickly. Gaining a maximum achievement needs exercise theory is supported by various disciplines such as philosophy, sports psychology, biomechanics, history, sports nutrition, PPPk, growth and development, anatomy, physiology, and training skills. Better sports achievements need to be supported by the existence of infrastructure and supporting facilities (Nugraheni, Rahayu, & Handayani, 2017).

Volleyball is a team sport in which two teams of six players are separated by a net (Putra, Sudiana, & Tisna, 2018). There is volleyball, namely beach volleyball, for each group consisting of two players and this game is played on sand. The FIVB is the governing body responsible for all forms of Volleyball on a global level, while in Indonesia there is The Indonesian Volleyball Federation, commonly called PBVSI (Indonesian: *Persatuan Bola Voli Seluruh Indonesia*) sometimes translated as All-Indonesian Volleyball Association) is the governing body of volleyball and beach volleyball in Indonesia. Volleyball is extremely popular in Indonesia (Lubis & Saputra, 2019).

Exercise is an activity that is conducted systematically by training, continuing process, and the more exercises and works (Nasution &

Muhammad, 2019). Volleyball players must have stunning physics to run set by set and well-programmed physical training process so the physical factors in volleyball can be mastered. It can give a positive impact on mental and physical health which eventually has a direct effect on playing technique. Volleyball players urgently need strength including arm muscles and leg muscles, endurance muscles including abdominal muscles, arm muscles, three shoulder muscles, speed, flexibility, power such as leg muscles, arm muscles, endurance covering the heart, lungs, and good coordination of motion (Abidin et al., 2020).

Sports has many factors that affect the success of a team to win, including the individual ability factor in mastering skills and technical abilities, and physical endurance (Handhin, Nasuka, & Hadi, 2018). The perfection of basic movement techniques is important because it will determine the overall movement of the skill. The basic movement of each form of sport must be perfectly trained, mastered, and carried out as efficiently as possible. In volleyball games that must be mastered are service, passing, smash and block (Arte, Nasuka, & Wahyudi, 2020). Meanwhile, the focus of this research lies on smash. The Smash technique is a dynamic movement, where a player jumps high, hits an object that moves with the right energy and direction, and exceeds the net.

Smash is a dynamic movement, where a player jumps high, hits an object that moves with the right energy and direction, and goes beyond the net or net (Bakar, Nasuka, & imam Santosa, 2019). Therefore, to do a smash the player must be supported by a good jumping or jumping ability. The length of the limbs is something that must be considered in volleyball, especially for spikers, so by having a good leg length, the smash performed will be difficult to contain. In volleyball, the particularly important technique to get points is a smash (Pamungkas & Wibowo, 2020).

In performing a smash, the strength of the arm muscles has a significant role. Arm muscle strength is the ability of the arm to generate tension in endurance and lift weights (Abrian &

Nasuka, 2021). Strength is the ability of muscles that use maximum energy to lift weights. Power is defined as the energy used to change the state of motion or shape of an object. Strength can help improve components such as speed, agility, and accuracy (Wisniarti & Hermanzoni, 2020).

Smash practice with a static ball is an exercise that begins with the practice of smash movement by hitting the ball still (not fed), then in the next stage, the ball is fed as in the real smash. In general, smash exercises are carried out directly using a moving ball (fed balls) such as the actual smash movement technique (Riyadi, 2012). In addition to the strength of the arm muscles to support the success of the smash is to do the right start, the right timing, the right focus, and make the maximum possible jump to be able to reach the ball above the lip of the net and make a punch towards the ball precisely on the palm as fixed as possible (Prasetyo, 2015).

Power is the ability of muscles to exert maximum strength very quickly. The strength of the limb muscles is an element to form the explosive power of the limb muscles (Ricky, 2020). Leg muscle strength is one of the physical components that must be owned by athletes where athletes must be able to exert strength explosively in the shortest time. Therefore, power training in weight training should not only emphasize the weight, but also the speed of lifting, pushing, or pulling the load. The form of movement from power is always explosive (Oktariana & Hardiyono, 2020).

In addition to the strength of arm muscles and the strength of leg muscles, physical condition is also influential in improving the ability to smash volleyball (Junaidi, 2021). Physical condition is an important element and becomes the basis for developing techniques, tactics, and strategies in playing volleyball. The physical condition can reach the optimal point if the exercise starts from an early age and is done continuously.

Based on these characteristics, volleyball players must train and strengthen themselves with physical exercise. The purpose of physical exercise is to help athletes develop their potential and skills as much as possible (Juharman, 2015).

In the experiment, the athlete can make a smash if the athlete can make a smash and the ball goes into the opponent's area that has been given certain limits without touching the net. Before doing the test, athletes are welcome to do a smash test 2 times. Athletes smash 5 times. Athletes perform smashes by hitting the ball that is inflated by the assistant, the athlete's initial position to make a smash is behind the attack line. The assessments correspond to the fall of the ball in the target area that has been marked.

Data obtained from the smash test results above showed 3 athletes who obtained a proficient level of smash ability, 9 athletes with moderate smash results, and 12 athletes with low smash success categories. According to that matter, the researcher conducted research entitled "The Influence of Training Methods and Arm Muscle Strength towards Volleyball Smash at Youth and Sports Department of Kendal (Disspora)".

METHOD

This research employed a quantitative approach by conducting pre-test and post-test experiments. Sample of this research was 24 members of the volleyball club in Kendal Youth and Sports Department Disspora Kendal (hereafter would be mentioned as Disspora Kendal). The researcher conducted a test for the strength of arm muscle by using a hand dynamometer. Based on 28 research populations, gained 24 people as a research sample and divided into two groups by using purposive sampling. Following the results of the level of strength of arm muscles obtained by the method of exercise using a hung ball and tire rubber rope.

This research was conducted for one month with a training program four times a week. In two or more factorial designs, variables were manipulated simultaneously to figure out the effect of each variable on the dependent variable with the effects that were caused by interaction between variables (Arief, 2004). The exercise group used a ball on the hanger and high arm muscle strength. The ball exercise group was on the hang and the strength of the

arm muscles was low. The tire rubber rope exercise group and arm muscle strength were high. The tire rubber rope exercise group and the strength of the arm muscles were low.

The data retrieval instrument in the study to get the results of swimming exercises is with

pre-test techniques and post-test details and the stages of research are as follows. Researchers give pretest volleyball smash referring to volleyball research instruments (Nurhasan, 2007).

Table 1. Hand Dynamometer Norm Referenced Test

No	Man	Woman	Category
1	55.50- above	42.50 – above	Excellent
2	46.50-55.00	32.50-41.00	Good
3	36.50-46.00	24.50-32.00	Fair
4	27.50-36.00	18.50-24.00	Poor
5	27.00	18.00	Bad

(Nurhasan, 2007)

Data analysis was carried out as a prerequisite test of analysis, namely the normality test (Kolmogorov Smirnov test) and Variance Homogeneity Test (with Levene's test). The Normality Test aimed to find out whether the data used in the study came from a normally distributed sample or not. The homogeneity test aimed to determine whether the variance in each group was homogeneous or not.

Quantitative analysis in this research employed two-way factorial analysis techniques (ANOVA) at the significance level of $\alpha = 0.05$.

To test the comparative hypothesis of the sample average.

RESULT AND DISCUSSIONS

The Differences in the Influence of Hanging Ball Exercises and Tire Rubber Ropes on Volleyball Smash

Complete results of the normality sample test showed in the appendix while the summary could be seen in table below:

Table 2. Result of Normality Sample Test

Method	Kolmogorov Smirnov			Shapiro Wilk		
	St	df	Sig.	st	df	Sig
Hanging Ball	.201	12	.195	.919	12	.274
Rubber Ropes	.147	12	.200	.918	12	.267

The normality test of this research had a sample count of less than 50 in each group, so the normality test employed the Shapiro-Wilk technique. With a significant level of 5%, then the data was said to be normal if the result of the sig value > 0.05 and abnormal if the sig value < 0.05 .

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

Table 3. Test of Homogeneity

Levene's Test of Equality of Error Variances ^a			
Dependent Variable: Value			
F	df1	df2	Sig.
2.173	3	20	.123

The homogeneity test in this study used the test of Homogeneity of Variances technique. The data stated to be homogeneous if the result of a sig value > 0.05 and not homogeneous if the sig value < 0.05 . Based on the results of the homogeneity test analysis above, a sig value of $0.123 > 0.05$ was obtained. Then it concluded that the data in this study had a homogeneous variance.

Table 4. Results Data

Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	720.333 ^a	3	240.111	49.507	.000
Intercept	3552.667	1	3552.667	732.509	.000
Muscle Strength	228.167	1	228.167	47.045	.000
Method	468.167	1	468.167	96.529	.000
Muscle Strength * Method	24.000	1	24.000	4.948	.038
Error	97.000	20	4.850		
Total	4370.000	24			
Corrected Total	817.333	23			

Based on the results of the Tests of Between-Subjects Effects output above, a sig value for the Method (Ball in Hanging and Tire Rubber Rope) was 0.000 (<0.05). Then it concluded if there was a significant difference in influence between the practice of smashing the

ball on the hang and the rubber rope of the tire on the ability to smash the volleyball.

So, if it was said that showed difference, the group that had a better improvement between the ball on the hang and the rubber rope. This result WASs shown in the following table:

Table 5. The Difference between the Influence of Exercise Method

Estimates				
Dependent Variable: Value				
	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
High	15.250	.636	13.924	16.576
Low	9.083	.636	7.757	10.409

Based on the table above, the increase in the hanging Ball group by 16,583 was better than the tire rubber rope group which was only 7,750.

Difference between The Influence of High and Low Muscle Strength on Volleyball Smash

According to the results of the Between-Subjects Effects output above, obtained a sig value for Muscle Strength (high and low) of

0.000 (<0.05). In sum, if there was a significant difference in influence between the strength of high arm muscles and the strength of low arm muscles on the ability to smash volleyball.

So furthermore, if it was said that there was a difference, the group that had a better improvement between high arm muscle strength and low arm muscle strength. This result was shown in the following table:

Tabel 6. The Difference of Arm Muscle Influence

Estimates				
Metode	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Hanging Ball	16.583	.636	15.257	17.909
Rubber Rope	7.750	.636	6.424	9.076

Based on the table above, the increase in the high arm muscle strength group of 15,250 was better than the low arm muscle strength group where showed value 9,083.

Interaction between Exercise Method and Arm Muscle Strength towards Volleyball Smash

Based on the results of the Between-Subjects Effects output above, obtained a sig

value for Muscle Strength * Method of 0.038 (<0.05). Then if there was an interaction between the exercise of the hanging ball, the rubber rope, and the strength of the arm muscles

to the ability to smash the volleyball. The interactions in this study can be seen in the following table:

Table 7. Interaction between Exercise Method and Arm Muscle Strength towards Volleyball Smash

		Dependent Variable: Value			
		95% Confidence Interval			
Muscle Strength	Method	Mean	Std. Error	Lower Bound	Upper Bound
High	Hanging Ball	18.667	.899	16.791	20.542
	Rubber Rope	11.833	.899	9.958	13.709
Low	Hanging Ball	14.500	.899	12.625	16.375
	Rubber Rope	3.667	.899	1.791	5.542

Based on the table above, it showed that sample who had high muscle strength were better if given the method of hanging ball training than given the rubber rope method and individuals who had low muscle strength are also better if given the method of hanging ball training than given the tire rubber rope exercise method.

DISCUSSIONS

The group of ball training methods was hung with high arm muscle strength (M(18,667)). The ball training group was hung with low arm strength (M(14,500)). Rubber rope exercise group with high arm muscle strength (M(11,833)). Rubber rope exercise group with low arm muscle strength (M(3,667)).

The results of the average difference between the two groups showed that the group of children with suspended ball training and high arm muscle strength had better volleyball smash results. A smash is a deadly attack, many points in the smash result are accurate and sharp, so the smash technique is often referred to as the ultimate technique to get points (Oktariana & Hardiyono, 2020).

This showed that the increase in athletes' smash results was not only had done using the exercise methods applied but also affected by the strength of the arm muscles (Sulistiadinata & Purbangkara, 2020). The findings in this study indicated that the athletes had a substantial improvement in the hanging ball exercise group and high arm muscle strength.

(Abidin et al., 2020) The findings of the study showed that split squat jump training was effective in improving the accuracy of spikes in experimental design models. However, the irregularity of the trainees indicates the result of the difference in value between players against the high and low spike results, as well as the focus on doing exercises continuously. Although this training program was simple, it could be an alternative to increase spike accuracy effectively and efficiently in soccer athletes and to find new potential players in volleyball.

CONCLUSION

There was a difference in the influence of the practice method on the results of the volleyball smash. The hanging ball training method had a significantly faster smash result than the rubber rope treatment. The strength of the arm muscles influenced the results of the volleyball smash. High arm muscle strength had a significantly faster smash result than low arm muscle strength. There was an interaction between the training method and the strength of the arm muscles in the results of the volleyball smash.

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