THE EFFECT OF VERTICAL JUMP EXERCISES ON VOLLEYBALL SMASH ABILITIES

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Abstract.
The problem of this research is whether there is an effect of vertical jump training on the volleyball smash ability of Luwuk Muhammadiyah University students. This research aims to determine the effect of vertical jump training on volleyball smash ability. The research method used is Quasi-Experiment, while the design is a time series experiment. The subjects of this research were the Muhammadiyah Luwuk Banggai University volleyball team, consisting of 12 athletes. The research results showed that the t value of the initial test and final test of volleyball smash ability was 19.621 and the sig value. 0,000. Because tilapia sig. 0.000 < α 0.05, then the alternative hypothesis (H1) is accepted and the Null Hypothesis (H0) is rejected. This means that there is an influence of vertical jump training on volleyball smash ability. The conclusion of this research is that there is an influence of vertical jump training on the volleyball smash ability of the Luwuk Banggai Muhammadiyah University volleyball team.

A. INTRODUCTION

Coaching to achieve achievement in playing volleyball cannot be separated from the influence of physical, technical, tactical and mental conditions. Physical preparation is very important to improve and strengthen technical quality. Without good physical preparation, it will be difficult to achieve high performance (Ricky, 2020).

An athlete's performance is greatly influenced by the training and training program provided by a coach. A coach must be able to develop training models that can influence the athlete's technique and tactics. The characteristics of the volleyball game really require biomotor components such as explosive power, speed, agility and endurance. The basic attack technique in volleyball is called Smash. Smash is one of the attack methods used by each team to get points. In the game of volleyball there are several smash techniques including Quick, open, semi,

double step, L step and many others. (Cirana et al., 2021).

Moving on from the reality that the author encountered on the field among male athletes from the Luwuk Banggai Muhammadiyah University volleyball team, there were problems when the volleyball athletes performed smash movements. One of them is that when smashing, several players fail to penetrate their opponent's defense. This can be seen when the ball is easily intercepted or blocked by the opponent and the ball cannot cross the net so it falls in the own playing area. Apart from that, another problem is that players' jumps are not very high. To be able to improve jumping results, intense and continuous training is needed, the exercise in question is vertical jump training, which is a type of plyometric training. Plyometric training is a variety of training and quite a lot, therefore researchers tried to use two forms of training, namely vertical jump training. The reason researchers use these exercises is because most of the exercises are specifically for leg and hip movements, because this muscle group is the center of power for sports movements and has major involvement in all sports, especially when doing volleyball smash movements (Bakar & Santosa, 2019). Based on the previous explanation, the problem taken in this research is whether there is an influence of vertical jump training on volleyball smash ability. The purpose of this research is to find out how much influence vertical jump training has on the volleyball smash ability of Muhammadiyah Luwuk University volleyball team.

A person who carries out an activity regularly, planned, repeatedly with increasingly heavy workloads is often stated that the person is doing exercise (Nur et al., 2020).

The functions and objectives of training are 1) improving basic physical qualities in general and overall, 2) developing and increasing general and specific physical potential, 3) adding and perfecting tactical skills and techniques, 4) developing skills and perfecting strategies, tactics and patterns. playing, 5) improving the quality and psychological abilities of sportsmen in competing (Sukadiyanto, 2011:9) in (Akhmady et al., 2020).

According to (Pardiman et al., 2021) vertical jump is the ability to jump as high as possible by a person by utilizing the explosive power of the leg muscles. A person's vertical jump ability varies from one person to another. This is influenced by the anatomy of the person's body. The higher the jump, the stronger the leg muscles/explosive power used.

According to (Aguss et al., 2021) a vertical jump is an upright jump that is done without using a start with the arm reaching as high as possible. Vertical jumps are quite widely used in sports, one of which is volleyball. Vertical jumps are very important when smashing and jumping to defend (dam) your opponent's smash. The series of vertical jump movements includes countermovement, propulsion, flight and landing. The height and

low of the vertical jump is influenced by the strength of the leg muscles. Apart from that, there are also several components that must be considered, namely cardiovascular, pulmonary work capacity, muscle performance, flexibility and several social and psychological aspects. Muscle performance itself consists of muscle strength (power), muscle endurance (endurance) and muscle macroscopic.

According to (Naipon & Akhmady, 2023) volleyball is carried out with the aim of physical and spiritual health, apart from that, volleyball also aims to achieve achievement. Then achieving achievement is not easy, you have to carry out a training program in accordance with the principles of a sports training program that has been established.

According to (Pranopik, 2017) the smash technique is the most difficult technique and has complex movements, so the smash technique must be trained on athletes from an early age because at an early age it is a stage that is vulnerable to movement errors. Smash is a technique that has movements consisting of: (1) Initial step, (2) Repulsion, (3) Hitting the ball while in the air, and (4) When landing. This shot must go over the net and make it difficult for the opponent to return the ball.

According to (Rahadian, 2019) a smash is a blow where the hand makes full contact with the ball at the top, so that the ball travels steeply at high speed. In the game of volleyball, smash is one of the techniques that must be mastered by a volleyball player. The correct smash movement technique in the game of volleyball includes: Run up (start), take off (take off), hit (hitting the ball in the air) and landing (landing) so as to produce an attack in the game of volleyball by hitting the volleyball as hard as possible so that The ball travels steeply at high speed and can produce points.

According to (Rahadian, 2019) a smash is a blow where the hand makes full contact with the ball at the top, so that the ball moves steeply at high speed. In volleyball, smash is one of the techniques that must be mastered by a volleyball player. The correct smash movement technique in volleyball includes: Running up (start), taking off (taking off), hitting (hitting the ball in the air) and landing (landing) to produce an attack in volleyball. by hitting the volleyball with all your strength so that the ball launches sharply at high speed and can produce points.

Muhammadiyah Luwuk University volleyball players in their volleyball smashes are in the fair category. Where there are several players who are not doing their volleyball smashes optimally, which can be seen by the fact that the smashes are still out of the court and also do not go over the net and can be easily blocked by opposing players. This is because several supporting factors are not optimal, one of which is the player's jump and reach when smashing.

B. RESEARCH METHODS

According to Sugiono (2016) in (Ricky, 2020) Experimental research is to determine the effect of the independent variables, namely vertical jump training, on the dependent variable, namely volleyball smash ability. The

research method used is Quasi-Experiment, while the design is a time series experiment (Yusuf, 2005) in (Ricky, 2020). The experimental design used is the time series experiment. In certain circumstances where there is no control group used, the time series experiment can be used to determine cause and effect relationships.

The population is the entire research object (Arikunto, 2010) in (Nugroho & Gumantan, 2020). The population in this study was the Muhammadiyah Luwuk Banggai University volleyball team, totaling 12 athletes. And Sempel is part of the number of characteristics possessed by that population (Prasetyo, 2005) in (Nugroho & Gumantan, 2020). This research uses a purposive sampling technique. Purposive sampling is a technique for determining samples with certain considerations. From this statement, the purposive sampling technique based on the sample meets the research criteria (Nugroho & Gumantan, 2020).

The technique used in collecting data is observation by making direct observations and at the same time carrying out tests. The instrument used in this research is a test measuring volleyball smash ability (Aguss et al., 2021).

C. RESULTS AND DISCUSSION

Table 1. Summary of Descriptive Results of Volleyball Smash Ability Data in Preliminary and Final Tests

Descriptive	Pre-test	Post-test
Mean	14.83	17.75
Median	15.00	18.00
Mode	15	18
Std. Deviation	2.290	2.379
Range	9	10
Minimum	10	13
Maximum	19	23
Sum	178	213

1. Initial test of smash ability

Based on table 1 above, the mean value of the initial smash ability test is 14.84, the median value is 15.00, the mode value is 15, the std value. deviation is 2.290, range value is 9, minimum value is 10, maximum value is 19 and sum value is 178. Next, the data is created in the form of a frequency distribution table as follows:

Table 2. Frequency Distribution of Initial Tests of Volleyball Smash Ability

Interval	Frequency	Percent	Valid Percent	Cumulative Percent
10	1	8.3	8.3	8.3
12	1	8.3	8.3	16.7
14	2	16.7	16.7	33.3
15	4	33.3	33.3	66.7
16	2	16.7	16.7	83.3
17	1	8.3	8.3	91.7
19	1	8.3	8.3	100.0
Total	**12**	**100.0**	**100.0**	

Based on table 2 above, from the 12 athletes, the 10th interval consisted of 1 person with 8.3%, the 12th interval consisted of 1 person with 8.3%, the 14th interval consisted of 2 people with 16.7%, the 15th interval consisted of 4 people with 33, 3%, interval 16 consists of 2 people with 16.7%, interval 17 consists of 2 people with 8.3% and interval 19

consists of 2 people with 8.3%. Next, in histogram form, see the image below:

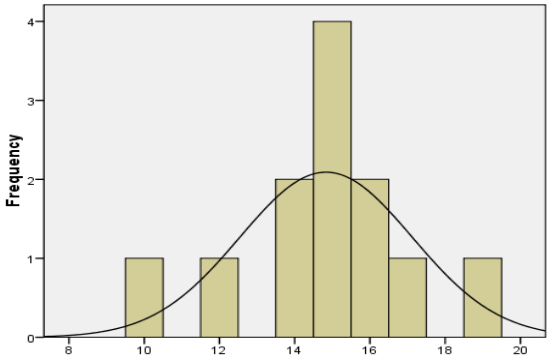

Figure 1. Histogram of Initial Smash Ability Test.

2. Final test of smash ability

Based on table 1 above, the mean score for the final smash ability test is 17.75, the median score is 18.00, the mode score is 18, the std score. deviation is 2.379, range value is 10, minimum value is 13, maximum value is 23 and sum value is 213.

Table 3. Frequency Distribution of Final Volleyball Smash Ability Test

Interval	Frequency	Percent	Valid Percent	Cumulative Percent
13	1	8.3	8.3	8.3
15	1	8.3	8.3	16.7
17	2	16.7	16.7	33.3
18	5	41.7	41.7	75.0
19	2	16.7	16.7	91.7
23	1	8.3	8.3	100.0
Total	**12**	**100.0**	**100.0**	

Based on table 3 above, of the 12 athletes, interval 13 consists of 1 person with 8.3%, interval 15 consists of 1 person with 8.3%, interval 17 consists of 2 people with 16.7%, interval 18 consists of 5 people with 41, 7%, interval 19 consisted of 2 people with 16.7% and interval 23 consisted of 1 person with 8.3%. Next, in histogram form, see the image below:

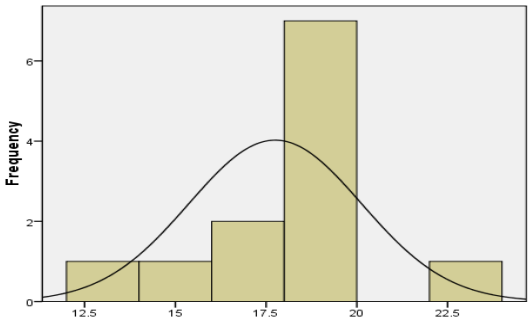

Figure 1. Histogram of Final Smash Ability Test

3. Normality Test

This research first tested the analysis requirements with a data normality test to determine whether the data from the variables studied were normally distributed or not. The Shapiro-Wilk test could be used with a significance level of $\alpha = 0.05$.

Table 4. Summary of Normality Test Data for Preliminary Test and Final Test of Volleyball Smash Ability

Variabel Tes	Statistic	df	Sig.	Information
Pre test	0,944	12	0,546	Normal
Posttest	0,887	12	0,109	Normal

Based on table 4 above, the statistical value obtained for the Shapiro-Wilk initial test of volleyball smash ability is 0.944 and the sig. 0.546. Because tilapia sig. 0.546 > α 0.05, so the initial test data for volleyball smash ability is normally distributed, while the Shapiro-Wilk statistical value for the final test of volleyball smash ability is 0.887 and the value is sig. 0.109. Because tilapia sig. 0.109 > α 0.05, then the final test data for volleyball smash ability is normally distributed.

4. Homogeneity Test

After the normality test has met the requirements, continue with the homogeneity test. The homogeneity test aims to find out whether the two data come from the same 2 groups. This test was carried out using the anova test of homogeneity of variance.

Table 5. Summary of Homogeneity Test Data for Preliminary Test and Final Test of Volleyball Smash Ability

Levene Statistic	**df1**	**df2**	**Sig.**	**Information**
0,006	1	22	0,937	Homogen

Based on table 5 above, the Levene statistical value of the initial test and final test of volleyball smash ability is 0.006 and the value is sig. 0.937. Because tilapia sig. 0.937 > α 0.05, then the data from the initial test and final test of volleyball smash ability are homogeneous or come from the same variance group.

5. Hypothesis testing

This hypothesis testing is carried out after normality and homogeneity tests have been fulfilled. The hypothesis proposed in this research is that vertical jump training has an effect on volleyball smash ability.

Table 6. Summary of Hypothesis Test Data from Preliminary Test and Final Test of Volleyball Smash Ability

Variabel Tes		**t**	**df**	**Sig. (2-Tailed)**
Pair 1	*Pretest-posttest*	19,621	11	0.000

Based on table 6 above, the t value of the initial test and final test of volleyball smash ability is 19.621 and the sig value. 0,000. Because tilapia sig. 0.000 < α 0.05, then the alternative hypothesis (H1) is accepted and the Null Hypothesis (H0) is rejected. This means that there is an influence of vertical jump training on volleyball smash ability.

Based on the research results, the t value of the initial test and final test of volleyball smash ability was 19.621 and the sig value. 0,000. Because tilapia sig. 0.000 < α 0.05, then the alternative hypothesis (H1) is accepted and the Null Hypothesis (H0) is rejected. This means that there is an influence of vertical jump training on the volleyball smash ability of the Luwuk Banggai Muhammadiyah University volleyball team. By doing vertical jump training for 14 weeks with a frequency of 3 times a week, the results can improve your volleyball smash ability. Smash ability in volleyball can be increased if done with vertical jump training. The vertical jump exercise in question is the exercise of jumping upwards by reaching the highest number possible. Every athlete who wants to get maximum smash results must have a high jump. By jumping high, each athlete can hit the ball over the net and can also get past the opponent's block.

Smash ability is supported by the coordination of body movements with arm movements which are supported by arm muscle strength and wrist whipping. To achieve this achievement requires seriousness from athletes. All of this is impossible to achieve if it is not combined with serious and serious training so that you get the desired skills, namely skills in playing volleyball (Cirana et al., 2021).

The results of this research have been supported by the results of research conducted by (Ozon & Sistiasih, 2023) with the research title the effect of plyometric standing jump training on increasing the vertical jump of volleyball players in Tunas Harapan Ponorogo. The results show that the Sig value. (2-tailed) is obtained at 0.000 so it is less than 0.05 < (0.05), so this means that the null hypothesis is rejected (H0 is rejected) and hypothesis one is accepted (H1 is accepted). In this way, it can be concluded that there is a significant influence of plyometric standing jump training on the vertical jump ability of volleyball players at the Tunas Harapan Ponorogo club.

In this way, it can be said that the plyometric standing jump training treatment was able to produce a better average score compared to the average score that was not given treatment. So with plyometric standing jump training you can improve the vertical jump ability of volleyball players at the Tunas Harapan Ponorogo Club. Training using the plyometric standing jump training technique, which is carried out regularly, will be able to improve the vertical jumping ability of volleyball players (Ozon & Sistiasih, 2023). So it can be explained that a good vertical jump can have an influence on volleyball smash technique. This can be seen when a volleyball player performs a smash movement in the upward jumping stage.

The higher a player's vertical jump, the more freely a player can see the opponent's field and the less they can be reached by the opponent's blocks. Based on the results of this research, it is clear that vertical jump training can contribute to high jumps and has an effect on improving volleyball smash ability.

D. CONCLUSION

Based on the analysis and discussion that has been carried out, it can be concluded that there is an influence of vertical jump training on the volleyball smash ability of the Muhammadiyah Luwuk Banggai University volleyball team. Having programmed vertical jump training can have an influence on the height of a volleyball player's jump when performing a smash. So the height of the jump can influence the smash ability of the volleyball game.

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