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The Effect of Plyometric Standing Jump Exercise Towards High Jump of Volleyball Players UABV Universitas Negeri Malang

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ABSTRACT
Volleyball Players State University of Malang focus more on the exercises and no physical improvement exercises. The purpose of this study was to determine the effect of plyometric standing jump exercise on the height of UABV volleyball players jumping State University of Malang. This research uses pre-experimental research method using one group pretest- posttest design. The instrument used in this research is a vertical jump test. Based on the data already in the analysis of t-count = 9.291> t-table = 2.086 with significance level α = 0.05 meaning significant.

Keywords: *Plyometric standing jump exercise, High jumping, Volleyball.*

1. INTRODUCTION

Volleyball game is a team game that contains several techniques such as, "bottom pasing, top pasing, smash, service and block" [1]. The volleyball game is a game played or played by both teams, "where each team has six members in each field measuring 9 square meters for each team itself, and each team is not put together but separated by a net" [2]. Volleyball game is a sport that requires systematic and coordinated body movements, "volleyball game is a sport that uses complex movements and is not easy to do for everyone" [3]. In volleyball games required physical skills and abilities that aim for the main weapon in turning off the opponent's game, especially smashes. In doing smash, of course it is supported by high jumps in order to be able to place the ball in a sharp position downward, "so that it is deemed necessary to practice the ability of the smash and physical conditions in supporting skills" [4].

Increased stepping exercises in volleyball have been carried out and applied by many trainers. According to Sugiharto (2014: 129) states "Conceptually plometrics are based on muscle contraction movements, where forms of exercise such as plyometric are grouped into two, namely: (1) low intensity exercise (low impact) includes jumps in place exercises, Standing jumps and (2) training with high intensity (high impact) includes depth jump, hops, bounding exercises [5]. The standing jump study was conducted at the Bolavoli Activity Unit (UABV) Malang State University. The volleyball activities at the UABV are lacking in physical training aspects, so the achievements are less than optimal. It can be seen from the results of observations that researchers have done in every training schedule, where each exercise only warms up and regular training. One of the main indicators in this study to increase the height of jumps in volleyball is the plyometric standing jump exercise. Plyometric is a training method or model that can increase the power / strength of muscle explosions, "plyometric exercises are designed to move the limb muscles of the leg, because the power center of vertical jump movements uses leg muscle strength" [6].

Jump or standing jump is a form of exercise by jumping using both legs raised to the level of water or in front of the chest to pass over the existing barrier [7]. This exercise is done with the start of standing with both feet shoulder width apart, while for the arms position depends on the right and left side of the body edge, the movement is carried out simultaneously with a swing of the hand forwards followed by a vertical jump, while the position of the leg is bent, for the landing itself is followed with flexion force on the knee joint, so that in the initial position and get ready to do the same movements repeatedly with the body must stay in a straight line. Sri Haryono, et al (2013: 4) stated that the higher the jumps were made, the greater the athlete's leg power. For athletes who still lack power, special training such as plyometric standing jump training can be given to train the strength of the leg muscles [8].

From the pretest and posttest studies that have been done, standing jump exercises can increase the height of the jump, for the pretest results the average value (mean) = 44.6 cm and the posttest results after treatment the average value (mean) = 46.9 cm from lower surface [9]. From the information above shows that standing jump exercises can increase height jumps. From the pretest and posttest studies that have been done, standing jump exercises can increase the height of the jump, for the pretest results the average value (mean) = 44.6 cm and the posttest results after treatment the average value (mean) = 46.9 cm from lower surface [9]. From the information above shows that standing jump exercises can increase height jumps.

This plyometric standing jump exercise can increase the explosive power of the limbs of volleyball players. Plyometric standing jump exercises are generally the most popular exercises in improvement that are affected by physical conditions with the same training load. The training load with a systematic increase affects the strength of the thigh and calf muscles especially the rectus femoris, vastus medialis, vastus lateralis, biscep femoris, soleus, lateral hend gastrocnemeus, peroneus longus tibalis anterior. The method to be applied is aimed at increasing the volleyball of volleyball UKM players in Malang State University, so as to improve / improve the quality of the game and the achievements that will be achieved in sports, especially volleyball.

2. METHOD

The research design can be interpreted as a way to collect and analyze data with the design can be carried out efficiently and effectively in accordance with the objectives of the researcher. This research is a pre-experimental research using one group pretest-posttest design. "Research using a pre- experimental design with one group pretest-posttest design, is used to reveal the effect of standing jump training" [10]. Judging from the purpose of the pre-experimental study, standing jump is a free variable to the height of the jump, while the dependent variable is the height of the jump. Pretest measurement will be done first before the plyometric standing jump treatment is given, and then the volleyball player will be given treatment namely plyometric standing jump three times a week for six weeks in accordance with the existing training program. The last step after the treatment is given is the posttest measurement of the dependent variable to find out whether there is an influence on the height of the jump after the treatment is given.

The population of this study is the 26 volleyball players (UABV) of Malang State University. The way to collect sample data is by using Stratified Samples. Stratified sample is "sampling technique using or by means of certain characteristics, characteristics, abilities, and achievements which are the main characteristics of the population" [11]. The characteristics of the sample taken are men who have the ability and achievement in playing volleyball, a player who is often included in every match and has good playing characteristics. From the statement above the sample used was 20 members, of which the 26 members who were said to be included in the stratified sample were 20 members whose level of measurement was seen from their achievements and abilities that were strikingly better than the other 6 members. The members who are separated are 6 out of 20 members who are the remnants of the sampling, which are said to lack the ability and achievement strata. The samples included in the study using the stratified sample technique are 20 members of the entire population.

The instrument in this study uses a vertical jump test, which aims to determine the effect of the height of the jump training that has been given. According to Arikunto (2009:101) explains that "the instrument is a useful tool for researchers used for data collection" [12]. This is in accordance with the statement Alsyahbana (2012: 5) explains that "for the measurement of height jumps or leg muscle strength can use a vertical power jump test (vertical board)" [13]. For the implementation phase of the test is done by standing upright against the wall, resting on both feet, and the vertical jump board is right next to the right hand or left hand. Then the right hand on the vertical jump board is lifted straight up with the palm of the hand affixed to the scaled board, bent leg position to make the jump start as high as possible and the hands pinned to the scale board until it leaves a jaw that uses lime or flour as a marking tool.

In this study, data collection techniques in the form of observation, test techniques by measuring the height of jumps using a scale board vertical jump, giving treatment with a plyometric standing jump exercise program. There are two stages of data collection, namely 1) the preparation phase and the second) the implementation phase.

The preparation phase is the initial stage that is carried out before the research. In this stage, namely preparation, there are several things that are done include: a). literature study as required data collection, b). determine the research subject, c). compiling test instruments, d). arrange training programs namely plyometric standing jump, e). make a research permit to UKM (UABV) Malang State University, f). Prepare the facilities and equipment needed to conduct the pretest and posttest, g). Prepare blanks for test results.

The implementation phase is where the research phase is carried out, including: a). Prepare the subject for the initial test, namely the vertical jump test using a scale board, b). Giving plyometric standing jump exercise treatment alternately, which is done three times a week for six weeks with increasing repetition, c). do the final test (posttest) in the same manner as the initial test (pretest) to measure the height of the jump using a vertical jump scale board.

Eleven studies have obtained data that has been given treatment, there are several things that must be done by the study include the following: a). manage data, b). enter data with indicators that already exist or are determined into the table, c) analyze the data using the technique used, namely using the application sppss version 22.0 for MS. Windows.

Data analysis is largely determined by the type of data collected which is oriented towards the objectives to be achieved or the hypothesis to be tested. After obtaining data from the results of data collection, the next step to do an analysis of existing data. In this study using quantitative data analysis using t- test to be classified in the form of numbers. Analysis of the data in this study are as follows: 1). Normality test is carried out to find out whether the distribution of data obtained during the study (pretest and posttest) comes from populations that are normally distributed. To test the normality of the data "an analysis was conducted using the Shapiro-Wilk technique normality test, where the technique was used to determine whether the data came from the population by comparing the significance level of the data obtained with a level of 95%". If the level of significance in statistical testing is greater than 0.05, then the data distribution is declared normal, 2). Homogeneity test is a function to show whether or not the sample elements of the research sample are homogeneous. To find out the homogeneity test of the data obtained is homogeneous using the Levene test method, if the statistical value is greater than 0.05, the variance data obtained or possessed is said to be homogeneous, 3). Hypothesis testing in this study is to determine the influence and differences in the experimental group before and after treatment is given. To find out the results of the hypothesis test using t-test, where the t- test.

This is an analysis of the data used to calculate differences in data from before and after treatment given by researchers to research subjects with a rejection rate of hypothesis at $\alpha = 0.05$ or with a significance level of 95% and data analysis was performed using the SPSS version 22.0 for MS application. Windows.

3. RESULTS

The data obtained are the results of the initial test (pretest) and final test, namely treatment group given plyometric (posttest) high jumping volleyball players UABV State University of Malang.

A description of the data resulting from increasing the height of the stepping is presented in tabular form as follows

Table 1. Descripotion of Pretest and Posttest Ventical Jump Test Data

Data Type	Pretest	Posttest
N	20	20
Min	260	285
Max	265	288
Mean	274,35	277,40
Std. Dev	7,125	7,155

Table 1 shows a sample of 20 UABV volleyball players from Malang State University and scores obtained before and after the test. Measurement of the height of the jump in the treatment group using the vertical jump test that is with a minimum pretest score (initialtest) 260 and a maximum score of 265 with a standard deviation of the pretest results which is worth 7,125. The final test is a comparison test to find out the difference in the values obtained, to find out the value of the posttest (final test) with a minimum value of 285 and a maximum value of 288 with a standard deviation of 7.155. It can be seen that there was an increase in the standing jump exercise treatment.

Table 2. Descripotion of different data pretest and posttest ventical jump tests

Data Type	Pretest	Posttest
Total Score	5487	5528
N	20	20
Mean	274,35	277,40
Beda Mean	3,05	

From table 2 it can be said that there are 20 samples with scores or scores on the mean of the pretest test treatment group that is 274.35 while the posttest score itself is 277.40. The total score is the sum of the results of the overall pretest with a value of 5487 and the total score of the posttest score 5548. It can be concluded that the mean difference between the pretest and posttest has increased or increased the jump height, which is 3.05, this indicates that plyometric satnding jump exercises have increased in jump height.

Data normality test is a way to find out whether the data is normally distributed, so that it can be used in parametric statistics using Shapiro Wilk analysis techniques. Normality test calculation is performed with a significance level of $\alpha = 0.05$. The following are the results of the normality test.

Table 3. Normality Test Result (Shapiro Wilk)

Vertical Jump Test	Pretest	Posttest
Shapiro Wilk	0.919	0.910
Significance	0.96	0.63
Information	Normal	Normal

Table 3 nomality test seen from the table above shows the results of calculations that are significantly more than $\alpha = 0.05$. The value obtained from the significant pretest test is 0.96 with normal distribution greater than $\alpha = 0.05$ and significant posttest value obtained 0.63 which is also normally distributed. Thus it can be concluded that the test score data is included in the normal category.

Homogeneity test is used to find out a set of data that has been analyzed whether it is said to be homogeneous or not. Homogeneity test will be said to be significant if

the data is greater than 0.05 (α = 0.05). Homogeneity test results will be presented in Table 4. below with a significant level α = 0.05.

Table 4. Pretest and posttest homogenety test result

Data Test	Significance	Information
Pretest and posttest	0.909	Homogen

Based on tebel 4, the pretest and posttest homogeneity tests of the above experimental group showed significant values with pretest and posttest values 0.909> of α = 0.05. Thus the data obtained and tested are included in the homogeneous category.

After the prerequisite tests for normality and homogeneity are carried out, the next step is to look for the results of the t-test with the following results.

Table 5. List of T-Test result calculation of standing jump test

Data Type	t-count	t-table	df	Sig 2-tailed
Pretest and posttest	9.291	1.795	19	0.000

Based on Table 5 above, the results of the t-count height of jumps on respondents or volleyball players were 9,291> 1,795, meaning that the t-count with a value of 9.291 was greater than the test results of the 1.795 table. While the probability (sig 2-tailed) p = 0,000 with a significance level α = 0.05 indicates that the results of the pretest and posttest are significant differences.

After the data obtained, the next data is to analyze. Data analysis was performed with the help of the SPSS 22.0 for MS program. Windows This is done to obtain an accurate level of calculation and results compared to using a manual system.

There is also criterion testing is the null hypothesis (H0) is rejected, and if the probability (sig 2-tailed) is smaller than the significant level of α = 0.05 (95% confidence level) and an alternative hypothesis (Ha). While the null hypothesis (H0) is accepted if the probability value (sig 2-tailed) is greater than the significance level α = 0.05 (95% significance level) and the alternative hypothesis is rejected.

Based on the statistical results of the SPSS 22.0 for MS program. Windows, it can be concluded that there is an effect of increasing the height of the jump from the initial pretest test after the plyometric standing jump exercise is given to UKM volleyball players (UABV) of Malang State University.

4. DISCUSSION

After Plyometric Standing Jump is an exercise that affects the height of the jump and leg muscle strength. Plyometric Standing Jump can also be interpreted as a light and moderate exercise but a medium down exercise using the athlete's body weight, while those muderat can also provide additional burden on athletes.

Plyometric training requires fast and strong movements to produce more strength in the leg muscles. According to Sugiharto (2014:121) plyometric exercises are carried out in a way that is good and precise, strong, explosive so that in contraction and relaxation in the use of energy savings can be used as much as possible [5].

The intensity of training or called training load in plyometrics is also not arbitrarily given to volleyball players, because it must first know the state of the player in determining the training load. The training load is certainly distinguished between non athletes and athletes (beginners / experience). In plyometrics exercises that are determined ie a number of foot contact or by means of moderate intensity. Plyometric exercises are performed systematically as seen from the strength of the player in making foot contact with the basic base used. In plyometric training research "reaction strength is based on the imposition of ground contact after a jump" [14]. Determination in foot contact with the base does not use a system of individual knowledge (experience). Meanwhile, according to Sugiharto (2014: 123) states "as a basis for athletes who have been trained should use the indicator of the number of foot contact at least 200-400 foot contact, but this is not done directly using 200-400 foot contact, instead using an increase that starts from 60-150 foot landing ". From the conclusions above, it can be concluded that plyometric training is not given by their methods, but plyometrics training is given appropriately and measured using a predetermined training program before being given to athletes who will be used as objects [5].

The ability to make a jump depends on the strength of the leg muscle strength of each athlete how high the jump is. Leg muscle strength can be trained through physical exercises related to the element of power and speed on a regular basis. The ability of leg muscle power will change if it is able to adapt (response) to weight training given a physiological factor and is vulnerable to the right time. According to Sugiharto (2014: 71) the body's response is the ability of the body's bodily functions to impose a temporary or spontaneous burden [5].

Based on the results of research that has been done, namely the pretest and posttest high jumping volleyball players UABV Malang State University with a sig value of 0,000 smaller than sig <0.05, then the data is said to be significant from the results of t-test. The data that has been taken by researchers there is an increase in the height of the jump from the posttest value compared to

the initial pretest before the Plyometric Standing Jump exercise is given.

Increased jump height certainly depends on the burden on athletes and training programs that have been planned. Giving the training load is a medium weight using the body's own burden, while for increasing leg muscle power the training load is medium to muderat, so that the muscles experience stress and adapt to a good response at a predetermined time or duration. Mansur (2004: 3) strength training can see how many sets and repetitions will be used to be efficient for athletes, i.e. 3 sets of each set is done using 6 reps for experienced athletes, but the sets and reps can change and more the height increase depends on the response and adaptation of the athlete to the given training load [15].

Plyometric Standing Jump Training is an exercise that can increase height jumps well. Based on the analysis results obtained pretest and posttest data using t-test data it is said that the significance is smaller than $\alpha = 0.05$. T-Test Testing is used for hypothesis testing to determine the effect of plyometric standing jump exercises on height jumps. Testing by t- test the treatment group based on t-test calculations with a 95% confidence level showed a t-test 9.2291 while from the t-table showed 1.795 with a significance level ($p < \alpha = 0.05$), which means there are significant differences between the data pretest and posttest experiment group. The results of the hypothesis test prove that the alternative hypothesis set is acceptable. From the statement above can provide an understanding of research treatments that apply plyometric standing jump exercises can be well received by players, thus providing an influence in the form of increased jump height.

The comparison that occurs significantly can be seen from the results of the description of the data that has been tested. Mean difference data in the treatment group showed a value of 3.05, meaning that there was an increase in jump height. According to Widodo A (2013:80) states that plyometric standing jump exercises are very influential on the height of the jump with a very good increase for the height of the jump [9].

The jump height of UABV volleyball players in Malang State University has a pretty good average score on the initial pretest test of 274.35 and the final test (posttest) that has been given plyometric standing jump treatment with a value that has increased an average of 277.40 from after given treatment. It can be concluded that there was an increase in the plyometric satnding jump treatment group. Then the experimental group with plyometric standing jump exercises can be said to increase the height of the jump with the use of moderate-weight (body load) intensity. The increase in jump height depends on the individual player himself who has different characteristics with other players. According to Vassil K (2012: 39) "vertical jumping is an individual characteristic, so one needs to choose the exercise and determine the intensity and level according to it" [16].

Physical exercise in increasing height will experience a change in the working system of the muscles, due to a contraction in the muscles. Changes that occur when doing plyometric exercises, will change the body's work systems, especially neurimuscular to support the rapid work of muscles. According to (Sugiharto 2014: 122) plyometric training will result in muscle work more likely to be active and condition the working system of neuromuscular [5].

Plyometric terminology is a complex movement with up and down or jumping force. Plyometric exercises are performed by continuing to repeat from the styles that have been demonstrated. The movements in plyometric exercises not only affect the height of the jump, but can also affect the reflex of the drill. So the movement of plyometric exercises are usually called stretching movements in the muscles resulting in stronger muscle power. According to (Sugiharto 2014: 122) states that plyometric movement is a stretch in the muscles causing good reflexes to increase muscle power [5].

Regular plyometric standing jump training will result in changes in muscle strength. Because this exercise is an exercise whose function is to strengthen leg muscles, both for jumping volleyball players. Plyometric standing jump exercises also train the explosive power of the muscles when jumping during a smash during a volleyball game. While there are other research opinions about plyometric that "plyometric training is more effective than regular volleyball training in improving balance, strength, jumping power, and special skills in volleyball players" [17].

Adaptation in an exercise will experience a good response to the body, especially the part that is trained such as leg muscle power, including muscle maturity, physical and psychological conditions. "Adaptation is a change in the functional enhancement of the organs of the body which are related and have permanent properties. Adaptation also occurs when the exercise provides positive (functional) stimulation to the body with sufficient intensity and quality, thus providing metabolic changes and causing recovery of the muscle cells themselves [5].

A good and regular and continuous exercise with the right load will lead to adaptation. According to Carvalho A (2014: 125) states that the adaptation of strength training contributes to increasing muscle power output and developing energy production capacity to improve energy needs. Adaptation during exercise occurs when an increase in oxygen consumption is needed by the body, so that the body's system will work well, especially the heart that will be harder in its work, namely supplying blood throughout the body by carrying oxygen in muscles that contract to reduce stress [18].

Exercises that are implemented regularly based on a training program that has been designed, namely Plyometric Standing Jump exercises given to UAV volleyball athletes. The volleyball activity unit can be responded to well and has increased jump height.

5. CONCLUSION

Based on research that has been done about the effect of plyopmetric standing jump training on the jump height of male volleyball players of UKM (UABV) Malang State University, seen from the results of hypothesis testing prove that it is acceptable and significant. Obtained data from the results of the pretets and posttest through several stages of data testing can be concluded that the practice of plyometric standing jumps has an effect on the height of the jump with a change or the jump height of the volleyball player of the Volleyball Unit (UABV) State University of Malang.

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