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THE EFFECT OF JUMP TO BOX EXERCISES AS HIGH 30 CM AND 40 CM ON THE LEG MUSCLES POWER VOLLEYBALL PLAYERS GOVITA SEMARANG

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Abstract

The purpose of this study: 1) To find out the effect of jump to box exercise as high 30 cm on leg muscle power of Govita Volleyball Players Semarang, 2) To find out the effect of jump to box exercise as high 40 cm on leg muscle power of Govita Volleyball Players Semarang, 3) To find out the difference effect of jump to box exercise as high 30 cm and 40 cm on leg muscle power of Govita Semarang Volleyball Player. This research is using 16 women volleyball players Govita Semarang with range on age 13-15 years to be sample. The research design using a match subject design, the group division using the subject matched ordinal pairing formula A-B-B-A. Test instrument used a vertical jump test with a vertical board. Data analysis use a pair sample t-test to test the hypothesis. The results of this study: 1) There have an effect of jump to box exercise as high 30 cm on leg muscle power of Govita Semarang Volleyball Player with the result t_{count} (3,989) > t_{table} (2,364), 2) There have an effect of jump to box exercise as high 40 cm on leg muscle power of the Govita Semarang Volleyball Player with the result t_{count} (4,518) > t_{table} (2,364) , 3) Both result have same effect of leg muscle power of the Govita Volleyball Players Semarang, with difference result t_{count} (1,432) < t_{table} (2,364). The conclusions are: 1) There have an effect of 30 cm high jump to box exercise on leg muscle power of Govita Volleyball players in Semarang, 2) There have an effect of 40 cm high jump to box exercise on the leg muscle power of the Govita Volleyball players in Semarang, 3) Both exercises have the same effect on the results of the leg muscle power of the Govita Volleyball players in Semarang. For the future researchers who is interested to do the same research, they can adding a control group comparison.

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INTRODUCTION

Leg muscle power is the ability of leg muscle to contract rapidly when the resistance is coming rapidly suddenly and fastly, so that can causes the body to be pushed on front (horizontal) or on top (vertical) by jumping (Jaya et al., 2019).

In volleyball games leg muscle power is one of needed component in the physical condition (Adhi et al., 2017). The most important role of leg muscle power in volleyball is to give the best result on vertical jump, having maximum jump results when doing smash and blocking techniques will be beneficial for player in making effort to reach the ball at the highest point (Oktaviani & Donie, 2020).

The effort that can be used to improve the quality of leg muscle power by using one of the exercises which implementation is performed quickly and powerfully. Plyometric exercises are exercises to increase leg muscle power, which in implementation of the exercise is based on agility and power. The expected of plyometric exercise will be provide increasing a leg muscle strength and speed motion maximum (Suresh et al., 2017).

Plyometric exercise is one of the dynamic exercise power that aims to increase the strength of the muscles involved in the motion. This exercise is important for a sport that required the power of the leg muscles (Afrina & Tohidin, 2019). Determination of the jump height in plyometric exercise is significant for athletes when doing the exercise, because the preparation of the exercise program has been adjusted to the objectives of the training program to be achieved by the athlete (Suprianti & Paripurna, 2017).

Jump to box exercise is one of the plyometric exercise types which is implementation required the participant to jump from an object in a direction that is not too onwards, this exercise is only used to jump as high as possible by exerting all leg muscle power capability (Khalid & Rustiawan, 2020). The height of the box used to provide the exercise program is adjusted by the participants abilities (Arif & Alexander, 2019).

Govita Semarang Volleyball Club is one of clubs that carried out of sports coaching for the male and women categories from elementary, junior high, and high school levels. Based on observations by the researchers, especially in the women grup with the range of age 13-15 years old, which is one of the groups that very active in participating on exercise or several matches, looking for by the quality of their play, the group looks very potential. However, there were still have weaknesses when implementing smash, blocking, and jump service techniques which; when they do the jumps was less from optimal result because the power has still not maximum. Based on observations by the researchers on their initial jump ability, the following data below:

Table 1. Test Vertical Jump Observation Data by Govita Semarang Women Volleyball Players Vertical Board (13-15 Years Old)

No	Name	Achievement Height (cm)	Best Jumping Height (cm)	Difference Jump (cm)
1	Gessa	206	236	30
2	Fassa	196	242	46
3	Muthia	205	251	46
4	Resti	199	239	40
5	Nadya	194	225	31
6	Vega	207	242	35
7	Naswa	207	242	35
8	Aura	205	247	42
9	Salsa	195	231	36
10	Naya	211	251	40

11	Vannesa	200	243	43
12	Medina	207	255	48
13	Elda	205	255	50
14	Ayu	219	256	37
15	Agista	205	238	33
16	Naura	211	252	41

Based on observation data by researchers to determine the initial ability of the jump by Govita Semarang Women Volleyball Players (13-15 years old), the mean value of the jump is 40 cm. The result of jump is still less than optimal by the vertical jump test norm results. According to Ahmad Muchlisin (2020) the vertical jump test norm by the women vertical board with a value of 40 cm is included in the assessment category with a score of 3.

Tabel 2. The Vertical Jump Test Norm by Vertical Board for Women

No	Scores Category	Score
1	29 – 32	1
2	33 – 37	2
3	38 – 43	3
4	44 – 47	4
5	>48	5

The Club has provided an exercise program to improve the power abilities of players by implementing one of the jumps to box plyometric physical exercises, but in the application on that exercise is not enough variety, programmed, and systematic.

Based on the description by the researcher, the researchers trying to improve the ability of leg muscle power of the Govita Semarang women volleyball players (13-15 years old) by giving a jump to box plyometric exercise program with another variating, programming, and systemating by determined the height of the box that using high at 30 cm and 40 cm. It adjusted to the player's ability due to the player's jump.

METHOD

The type of this research is experimental research. The Method that is used for this research is match subject design. The group was distribution by using subject-matched ordinal pairing with the A-B-B-A formula from the pre-test result obtained by the sample. The determination of the treatment was determined by the results of the lottery of one delegation group. The lottery results determined that Experimental Group A received the jump to box treatment as high as 30 cm and the Experimental Group B as high as 40 cm. In this research using 16 atlet in Govita Semarang women Volleyball Player with category 13 to 15 years old to be a sample. The sampling technique is carried out by total sampling. There are two variables in this research, which is independent variables (X_1) jump to box exercise at high 30 cm, and (X_2) jump to box exercise at high 40 cm, while the dependent variable (Y) is leg muscle power.

The treatment was carried out for 16 meetings each week; 3 meetings were held on Tuesday, Thursday, and Saturday. The load was given in this exercise to the 30 cm group at the I and II meetings with 4 sets of 8 repetitions, the III and IV meetings 4 sets of 10 repetitions, and at the V and VI meetings 4 sets of 8 repetitions. At the same time, the load was given in this exercise the 40 cm group at the I and II meetings with 3 sets of 8 repetitions, the III and IV meetings 3 sets of 10 repetitions, and at the V and VI meetings, 3 sets of 8 repetitions.

The data collection technique was carried out through pre-test and post-test with the type of test instrument used was the vertical jump test using a vertical board. To find out whether an

effect on the exercise that given from 30 cm and 40 cm jump to box exercises on the leg muscle power of the women Govita Semarang Volleyball Players on the pre-test and post-test results of both groups, paired t-test will be use in this research.

RESULTS AND DISCUSSION

Based on table 3 the result of pre-test on experimental group A (box as high as 30 cm) obtained the average value of leg muscle power in the sample is 98.76 kg-m/sec, the standard deviation is 9.86, the highest value is 114.39 kg-m/sec, and the lowest is 82.73 kg-m/sec. In the post-test results, the average leg muscle power of the sample is 102.02 kg-m/sec, the standard deviation is 8.24, the highest value is 113.99 kg-m/second, and the lowest is 90.28 kg-m/sec.

The experimental group B (box as high as 40 cm) had an averaged pre-test value of 99.27 kg-m/sec, a standard deviation of 8.07, the highest value of 110.83 kg-m/sec, and the lowest value of 89. 38 kg-m/sec. the post-test results, the average value of leg muscle power is 103.3727 kg-m/sec, the standard deviation is 8.27, the highest value is 115.03 kg-m/sec, and the lowest is 91.42 kg-m/sec.

Tabel 3. Research Result Data Description

Variety Source	Experimental Group A		Experimental Group B	
	Pre-test	Post-test	Pre-test	Post-test
Total Sample	8	8	8	8
Mean	98,76	102,02	99,27	103,37
Standard Deviation	9,86	8,24	8,07	8,27
Highest Value	114,38	113,99	110,83	115,03
Lowest Value	82,73	90,28	89,38	91,42

Normality Test Results

The normality test is using by the researches to find out the data result from both the pre-test and post-test from the two groups were normally or not normally distributed with a significance value of 5% or 0.05.

The normality test results from the pre-test results data of the experimental group A (box as high as 30 cm) showed that the sig value was 0.828 > 0.05, while the post-test results obtained a sig value of 0.828 > 0.05. The normality test results on the pre-test value of the experimental group B (box as high as 40 cm) showed that the sig value was 0.351 > 0.05, while the post-test results obtained a sig value of 0.424 > 0.05.

Based on the guidelines by the researcher, if the significance value or probability value is > 0.05, so the data distribution is normal so that it can be say that the results of the pre-test and post-test experimental groups A and B are normally distributed.

Homogenity Test Results

The homogenity test was executed to find out whether the data produced by each group in the study have the same variance or not. In other words, homogenity means that each data set has the same characteristics. The sig value by the researchers in this homogeneity test is 5% or 0.05.

The results of homogenity test on the pre-test value of experimental group A (box as high as 30 cm) and B (box as high as 40 cm) obtained a sig value of 0.659 > 0.05. Meanwhile, the homogenity test results on the experimental group A and B post-test values obtained a sig value of 895 > 0.05. Following the guidelines by the researcher, if the significance value or probability value is > 0.05, the data distribution is homogeneous. It can be concluded that the

data from the pre-test and post-test experimental groups A and B results are homogeneous.

Hypothesis Test Results

To determine whether or not the effect of the treatment, the researcher has given the sample in the form of a jump to box exercises as high as 30 cm and 40 cm. Paired sample t-test was performed from the pre-test and post-test results of Experimental Group A (box as high as 30 cm) and Experimental Group B (box as high as 40 cm). The results of the t-test were carried:

Tabel 4. Pre-test and Post-Test T-Test Results

Variety Source	Experimental Group A	Experimental Group B
Pre-test Mean	98,76	99,27
Post-test Mean	102,02	103,37
t-count	3,989	4,518
t-table	2,364	2,364

Based on table 4 the t-test results of the pre-test and post-test values of the experimental group A (box as high as 30 cm) obtained the value of t_{count} (3,989) > t_{table} (2,364). The basis for deciding H_a is accepted if the results of t_{count} > t_{table} so that it can be concluded that the hypothesis 1 or H_a that the researcher proposes "There is an effect of 30 cm high jump to box exercise on the results of Govita Semarang Volleyball Players leg muscle power" can be accepted.

There is an effect of 30 cm jump to box exercise on the results of leg muscle for Govita Semarang Volleyball Players in line with a study by Sulaksono (2019) which in his research used a 30 cm high box. The study's conclusion stated that the jump to box exercise affected leg muscle power increase on the students of SMK Plus Darussalam Kediri.

The leg muscle power increase from the jump to box exercise, according to Jaya et al. (2019) because the jump to box exercise is performed by jumping both feet simultaneously and landing on the box. If the exercise is done repeatedly, it causes muscle hypertrophy due to an increase in myofibril, nerves, capillary vascular density, tendons, ligaments, and amount of contractile, especially in the contractile protein myosin. If the exercise is performed continuously, it will cause fibril enlargement, so that muscle strength will also increase, and it will occur in white muscle fibers (fast-twitch) too so that it can cause a muscle speed increase. Maximum muscle power is caused by an increase in speed and coupled with strength.

The results of the t-test on the pre-test and post-test value of the experimental group B (box as high as 40 cm) obtained the value of t_{count} (4.518) > t_{table} (2.364). The basic for decision making H_a is accepted if the results of t_{count} > t_{table}, so that hypothesis 2 or H_a proposed by the researcher said, "There is an effect of 40 cm high jump to box exercise on the results of leg muscle power of the Govita Semarang Volleyball Players" can be accepted.

There is an effect of jumping to box exercise as high as 40 cm on the leg muscle power of Volleyball players Govita Semarang, this research have a same result by Zakaria et al. (2018) exercise using a box size as high as 40 cm. The study stated that there has an effect of increasing leg muscle power in volleyball games.

The increase in power from the jump to box exercise is because it is a type of plyometric exercise that results from a combination of strength and speed; if the exercise is performed continuously, it affects leg muscle power (Putra et al., 2017).

To find out the results of the difference in leg muscle power between the two groups, a t-test was performed on the post-test results of the two groups; the results of the t-test were obtained as follows:

Tabel 5. Post-test T-Test Results

Variety Source	Experimental Group A and B Post-Test
n	8
t-count	3,989
t- table	2,364

Based on table 5, the results of the t-test of the post-test value of the experimental group A (box as high as 30 cm) and B (box as high as 40 cm), it was found that the value of tcount (1,432) < ttable (2,364). Basic for making decisions by researchers H0 is accepted if the results of tcount < ttable. So that hypothesis 3 or Ha proposed by the researcher said, "There is a difference in the effect of a jump to box exercises as high as 30 cm and 40 cm on the results of leg muscle power of Govita Semarang Volleyball Players" was rejected.

Both have the same effect on leg muscle power in the two groups it because the researchs using the energy difference on training program was less different, so the demands on leg muscle power during exercise between the two groups have not many different. Therefore, this research have a same theory by experts; according to Suprianti & Paripurna (2017) the difference in demands on the strength received or held by the leg muscles of the athlete causes the need for leg muscle power to also have differences according to the demands that they receive. The difference will be seen if the implementation of the exercise uses the fastest motor unit, the high debit, the frequency will be visible and the muscles will product highest power (Nugroho & Jayadi, 2021). Having the main power components, high power and speed, will have directed proportional to the power generate (Adhi et al., 2017).

CONCLUTION

Based on the results of statistical tests on pre-test and post-test group box as high 30 cm and 40 cm, and data analysis data and discussion of the results of statistical tests conducted by researchers, it can be concluded that:

1) There have an effect of 30 cm high jump to box exercise on leg muscle power of Govita Volleyball players in Semarang,
2) There have an effect of 40 cm high jump to box exercise on the leg muscle power of the Govita Volleyball players in Semarang
3) Both exercises have the same effect on the results of the leg muscle power of the Govita Volleyball players in Semarang.

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