

**The Effect of Box Jump Exercise on Increasing Leg Muscle Explosive Power in Volleyball Players at SMA N 10 Makassar****Muh. Sawqi Hasanuddin<sup>1✉</sup>, M. Iqbal Hasanuddin<sup>2</sup>, M. Imran Hasanuddin<sup>3</sup>, M. Irfan Hasanuddin<sup>4</sup>**Universitas Udayana, Indonesia<sup>1</sup>Universitas Muhammadiyah Palopo, Indonesia<sup>2</sup>Universitas Negeri Makassar, Indonesia<sup>3</sup>Universitas Khairun, Indonesia<sup>4</sup>**Article History**

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**Abstract**

Good volleyball players need the support of good physical abilities. Explosive leg muscle power is necessary for the implementation of starting and repulsing at certain angles, where strength is the basic muscle of power and muscle explosive power. Based on this, strength is the main element to produce power and muscle endurance. Muscle power can be increased and developed through box jump exercise. This research is a pre-experimental research that aims to determine the effect of box jump exercise on increasing leg muscle explosive power in volleyball players with a one group pretest-posttest research design. The sampling technique was purposive sampling so that a total sample of 10 people was obtained. The results show that the average value of the increase in leg muscle explosive power before treatment was carried out with a mean value of 57.90. As for the average after treatment with a value of 64.20. The results of the Wilcoxon test show that giving box jump training could increase the explosive power value of the leg muscles. The conclusion of this study is that giving box jump training for 8 treatments can increase the explosive power value of the leg muscles with a value of  $p = 0.005$ , which means  $p < 0.05$  so that it can be concluded that there is an effect of giving box jump exercise on increasing jumping power in volleyball players.

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## INTRODUCTION

Sport is a very important aspect in the development of a nation. With good sports achievements, the self-esteem or dignity of a nation will be better in the eyes of other nations or countries in the world. To achieve this, of course it is not easy to implement. Efforts are needed to increase maturity for a student and coaching must be carried out from an early age. Coaching in sports is absolutely necessary in order to perform well in the future. Because a maximum achievement is strongly influenced by the existence of superior generations, which must be conducted well and structured.

The development of volleyball in Indonesia has greatly increased and is growing rapidly, not only in urban areas but also in rural areas. The game of volleyball is also very popular with teenagers and parents. It can be seen from the many local competitions held in several regions. Good volleyball players need the support of good physical abilities. For example in smash and block which is the main weapon to win a match. To be able to do deadly smashes and blocks, The players need a high or maximum jump, commonly called explosive power.

Explosive power is the ability of a muscle or group of muscles to overcome load resistance with high strength and speed in a complete movement (Hasanuddin & Bungaeda, 2021). The explosive power referred to in this study is the explosive power of the limbs. Explosive leg power is needed in almost all sports, including: athletics, both in sprint, jumping and throwing; swimming such as basketball, soccer, volleyball; small ball games such as badminton, tennis, takraw, baseball; martial sport; and other sports. From the various sports above, the explosive power of the limbs has an important role in determining the athlete's ability to achieve achievements (Haryono & Personal, 2012).

According to (Utamayasa, 2020), that exercise is a plan to improve the ability to exercise which is carried out systematically and repeatedly (repetition) for a long period of time (duration), containing theoretical material, practice, methods and implementation rules in accordance with the goals and objectives to achieve optimal performance. Opinion (Chan, 2012) also said that exercise is to achieve the goal of improving the organism's system and its function to optimize sports performance or performance. The exercise referred to in this study is the box jump exercise, where the box jump itself is part of the plyometric exercise.

Of the various types of exercises that support leg muscle explosive power, the researchers chose plyometric exercises because plyometric exercises are easy to do and do not have to use difficult props. (Suprianti & Paripurna, 2017). This drill plyometric box exercise is further divided into several exercises according to their level of difficulty. Following are some divisions of box drills, including: 30-, 60-, or 90-second box drill (low 30 seconds, moderate 60 seconds or high 90 seconds), single-leg push-off (low), alternating push-off ( low), side to side box shuffle (low), scorpion step-up (moderate), front box jump (low to moderate), multiple box jump (moderate to high), lateral box jump (low to moderate), pyramiding box jump (moderate to high), lateral step-up (low), multiple box to box squat jumps (high), multiple box to box jumps with single leg landing (high) (Chu & Myer, 2013).

Box jump, This is a special exercise to increase leg muscle power. The muscles developed in box jumps include: thigh flexion, knee extension, adduction and abduction involving the gluteus medius and minimus, adductor longus, brevis, magnus, minimus and halucis muscles (Pomatahu, 2018). According to Chu in the journal (Zakaria et al., 2018) that the jump to box exercise is the exercise of jumping over the city of blocks then jumping back to the back like the initial attitude by using both legs together.

Based on the explanation above, the researcher can formulate this study, namely "Is there a significant effect of box jump training on increasing leg muscle explosive power in volleyball players at SMAN 10 Makassar?". Thus, the aim of this study was to determine the effect of box jump training on increasing the explosive power of leg muscles before and after being given box jump training to volleyball players at SMAN 10 Makassar.

## METHODS

The type of research used is pre-experimental design, which is a form of research where the selection of research subjects is carried out in a non-random manner, and does not have a control group or comparison group. The design or design used was The One Group Pretest-Posttest Design without using a control comparison group. According to (Ahyar et al., 2020), that the population is the entire research object consisting of humans, objects, animals, plants, symptoms, test scores, or events as a data source that has certain characteristics in a study. The population in this study were 24 volleyball players at SMAN 10

Makassar. According to (Darwin et al., 2021) that the sample is part or part or a small part of the object/subject contained in a research population. The sample in this study was taken by purposive sampling technique, where the sample taken was in accordance with the considerations of the researcher, namely 10 people.

Data collection techniques were carried out at the beginning and end of the study as pretest and posttest data. The measurement technique uses vertical jump and box jump measurement tests. Data collection through primary data by measuring the length of the limbs using a tape measure (cm) for each sample (pretest and posttest data). Data analysis techniques using the SPSS program. The data collected will first be tested for data normality. If the data is normally distributed, then a pretest and posttest difference test will be performed using a paired t test. If the data is not normally distributed, the Wilcoxon test will be used.

**RESULTS AND DISCUSSION**

In accordance with the variable, the research data obtained is the provision of box jump training to volleyball players at SMAN 10 Makassar. The results of calculating descriptive statistics by determining the distribution of the explosive power value of the leg muscles before and after being given treatment, then looking for the average value and the Wilcoxon test. The summary of the calculation results is listed in the **Table 1** below.

**Table 1.** Distribution of Leg Muscle Explosive Power Values in the Pretest

Criteria	Amount	Percentage
Excellent	3	30%
good	1	10%
Above Average	2	20%
Average	3	30%
Below Average	1	10%
Total	10	100%
Means	2.80	
SD	1,476	

Based on **Table 1** above, it shows the results of the 10 samples, there are 3 people (30%) who have excellent leg muscle explosive power with a vertical jump value of > 70 cm, 1 person (10%) who has leg muscle explosive power good (61-70 cm), 2 people (20%) who have leg muscle

explosive power above the average (above average) with a vertical jump value of 51-60 cm, 3 people (30%) who have muscle explosive power average leg (average) with a vertical jump value of 41-50 cm and 1 person (10%) who has below average leg muscle explosive power (below average) with a vertical jump value of 31-40 cm.

**Table 2.** Distribution of Leg Muscle Explosive Power Values in the Posttest

Criteria	Amount	Percentage
Excellent	3	30%
good	0	0%
Above Average	2	20%
Average	3	30%
Below Average	2	20%
Total	10	100%
Means	: 3,10	
SD	: 1,595	

Based on **Table 2** above, shows the results of the study after doing 3 times a week for a month 8 times counting and 5 repetitions using box jump exercises. For 10 samples, the results obtained were 3 people (30%) who had excellent leg muscle explosive power with a vertical jump value of >70 cm, 0 people (0%) who had good leg muscle explosive power with a value vertical jump 61-70 cm, 2 people (20%) who have above average leg muscle explosive power (above average) with a vertical jump value of 51-60, 3 people (30%) who have average leg muscle explosive power average (average) with a vertical jump value of 41-50 cm, and 2 people (20%) who have below average leg muscle explosive power (below average) with a vertical jump value of 31-40 cm.

**Table 3.** Mean Increase in Limb Muscle Explosive Power Pretest and Posttest

	n	Average Value	std. Deviation
Value of vertical jump pretest	10	57.90 cm	20,808
Value of vertical jump posttest	10	64.20 cm	23,146
Valid N	10		

Based on **Table 3** above, shows the average value of the increased explosive power of the leg muscles both before and after being given treatment. The average increase in leg muscle explosive power before being given treatment with an

average value of 57.90 cm. while for the average after being given treatment with a value of 64.20 cm. this shows that giving box jump training can increase the explosive power value of the leg muscles.

**Table 4.** Wilcoxon Statistical Test Results

Vertical jump value	Means	Standard deviation	p.s
Pretest	57.90 cm	20,808	0.005
Posttest	64.20 cm	23,146	

Based on **Table 4** above, it shows the results of the Wilcoxon statistical test where  $p = 0.05$  which means it is smaller than  $\alpha 0.05$  which means the research hypothesis is accepted or in other words there is a significant effect on increasing the explosive power of the leg muscles by giving box jump training.

The results of the research conducted before giving box jump exercises are shown in table 1 showing that from 10 samples there were 3 people (30%) who had excellent leg muscle explosive power with a vertical jump value of  $>70$  cm, 1 person (10%) who had good leg muscle explosive power (61-70 cm), 2 people (20%) who had leg muscle explosive power above the average (above average) with a vertical jump value of 51-60 cm, 3 people (30%) who have average leg muscle explosive power (average) with a vertical jump value of 41-50 cm and 1 person (10%) who has below average leg muscle explosive power (below average) with a vertical jump value of 31- 40cm.

The results of the research conducted after giving box jump training with 10 sample people in table 2 obtained the results of 3 people (30%) who had excellent leg muscle explosive power with a vertical jump value  $> 70$  cm, 0 people (0%) who had good leg muscle explosive power with a vertical jump value of 61-70 cm, 2 people (20%) had above average leg muscle explosive power with a vertical jump value of 51-60, 3 people (30%) who have average leg muscle explosive power with a vertical jump value of 41-50 cm, and 2 people (20%) who have below average leg muscle explosive power with a vertical jump value 31-40 cm.

The box jump exercise is an exercise in jumping up onto a block and then dropping back like the initial attitude by using both legs together. The exercise aims to increase the explosive power of the leg muscles. The height of the box used is 40 cm. Where leg muscle explosive power exercises are also used to increase speed and strength.

In line with opinion (Ayuningtyas et al., 2015), that plyometrics jump to box exercise gives significant results to increase leg power.

In the results of the study shown in table 3, the average pretest results were 57.90 cm and 64.20 cm posttest. this shows that there is a significant change after giving box jump training to the increase in leg muscle explosive power. Therefore, explosive power is needed in sports such as volleyball, especially when making jumps such as when doing smash, block, and jump service techniques. Opponent (Hidayat & Agus, 2021). Carry on, (Widiantari et al., 2015) said that an important component in determining jump height is influenced by the explosive power of the leg muscles where the amount of leg power in the leg muscles causes an athlete to be able to achieve a certain power value by overcoming the load or resistance to use at a certain angle.

This is because the box jump exercise can make the leg muscles contract faster so that maximum speed can occur so as to increase the explosive power of the leg muscles. This is in line with the results of the study (Jaya et al., 2018) said that at the same level there will be no physiological changes in muscle fibers, but a greater increase occurs in white muscle fibers (fast twitch) so that it can result in an increase in muscle speed. Maximum muscle explosive power is due to increased speed and added strength.

This is also supported by the results of research from (Mardesyadi & Gusril, 2019) that leg muscle explosive power is one of the components of physical condition which determines an achievement in sports, especially in volleyball.

## CONCLUSION

The conclusion of this research is that the average value of leg muscle explosive power before given the box jump exercise treatment was 57.90. While the average value of leg muscle explosive power after given box jump training was 64.20. It can be concluded that there is an effect of box jump exercise on increasing leg muscle explosive power in volleyball players at SMAN 10 Makassar with an average increase of 4.30.

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