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The Difference In The Effect Of Plyometric Squat Jump And Double Leg Bound Exercises On Increasing Leg Muscle Power In Extracurricular Volleyball Students of SMPN 3 Karanganyar

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ABSTRACT

The use of proper and correct plyometric training methods will increase strength and speed in performing basic volleyball techniques. From the plyometric exercise method, especially squat jump and double leg bound exercises, it is estimated to have an influence on leg muscle power. This research will be carried out in the courtyard of SMP Negeri 3 Karanganyar, Jalan Lawu No. 86, Ngarjosari, Karanganyar Regency, Central Java. This research will be carried out for six weeks starting on February 5, 2024 to March 16, 2024 with a frequency of meetings three times a week on Monday, Wednesday and Friday. The experimental method is chosen to determine certain symptoms through the treatment carried out on the experimental sample. An experiment is a pattern that allows researchers to simultaneously study the influence of two or more types of experimental variables. There was no significant difference in height increase between the squat jump and double leg bound treatment groups. Evidenced by the average increase in the squat jump treatment group by 5.7 (2.544%) while in the double legbox bound treatment group by 6 (2.819%). As well as the results of the statistical test of the anova test obtained a probability value of 0.436> 0.05.

Keywords: Exercises, Influence, Plyometric Squat Jump and Double Leg Bound

INTRODUCTION

Sports are forms of physical activity contained in games, competitions, and intensive physical activities in order to obtain recreation, victory and optimal achievement (Iyakrus, 2019). Some people tend to underestimate the meaning and importance of exercise for human life. But certain moments the importance of sports is recognized as something that has a certain function as well as meaning in human life always reappears. One of the sports favored by the public, both men and women, today is volleyball (Palar et al., 2015).

Volleyball is defined as a complex sport because not everyone can do it. In the sport of volleyball requires coordination of movements that play a role in carrying out all series of movements this (Aguss et al., 2021). game aims to drop the ball towards the opponent's court, so that the opponent cannot return the bole to the area we have (Pranopik, 2017). According to (Yono &; Sodikin, 2020) volleyball, it is a group sport carried out by 2 teams that are blocked by a net / net that has a height of 2.43 meters for men and 2.24 meters for women consisting of 6 players, with a court measuring 18 x 9 meters. Volleyball is a game carried out by 2 teams and 6 people when playing in each set, with the aim of dropping the ball towards the opponent's court so that the opponent cannot return the ball. Klik atau ketuk di sini untuk memasukkan teks.Klik atau ketuk di sini untuk memasukkan teks.

Efforts to improve the ability or maturity for an athlete, must be held coaching from an early age. Coaching in sports is absolutely necessary in order to perform well in the future. A maximum achievement is influenced by superior seeds, which when done well. Many examples of sports are done to maintain body fitness and also to develop achievements, one of which is the game of volleyball.

Basic volleyball technique is a very important component in the game of volleyball, such as *service, block,* and *jump service,* bottom passing, *top* passing. Some basic volleyball techniques require leg muscle power to jump. A volleyball athlete is expected to master good basic techniques to support

a good game. To master the basic techniques of volleyball, the right training method is needed to support maximum results. (Suarez, 2015)

The game of volleyball requires strength including arm muscles and leg muscles, endurance includes abdominal muscles, arm muscles, shoulder muscles, speed, flexibility, *power* covering the heart, lungs and good motion coordination (Siregar, 2015). These aspects are needed in order to be able to move, jump and react to get points both attacking and defending every match. Physical conditions that are indispensable in volleyball games are leg muscle strength and leg muscle explosive power, leg strength is needed to carry out attacks and defenses in volleyball games (Adnan & Amin, 2020) .

Sports achievements, especially sports that require *eplosive power,* explosive power is a component that can / is able to contribute to several movement techniques and some specialization numbers in sports. Given that in motion skills in sports achievements require more effort (explosive power) to achieve maximum performance and performance, each athlete is required to have standards in explosive ability (Douglas et al., 2021).

The training method is a scientific way by providing programmatic treatment to improve talent, skills, and physical condition in accordance with sports. There are several kinds of components of physical conditions that must be met in sports and their fulfillment is adjusted to the sport involved. Improving physical condition is one of the indicators for the achievement of better physical fitness (Ismoko & Sukoco, 2013).

Explosive power is one of the ten components of the physical condition. Explosive power is the ability to direct power quickly in a short time to provide the best momentum to the body or object in an explosive movement that is intact to achieve the desired goal (Bafirman & Wahyuri, 2018). *Strength is the ability of* a muscle or several muscle groups to optimize strength or movement under certain conditions, which is usually to resist or respond to pressure loads from outside the body (Mintarto, 2019).

In volleyball, the great opportunity to turn off the ball or get points is to make a smash punch , thus the player must be supported by the ability of *vertical jumps* and explosive power of leg muscles when they want to do repulsion. The explosive power of these leg muscles occurs due to mutual shortening and lengthening of the lower upper leg muscles supported by the push of the leg muscles with maximum strength and speed. (Oktariana & Hardiyono , 2020)

In the implementation of vertical jump power, leg muscles are needed so that there is a need for efforts to increase exercise. To make it easier to do smash and block techniques, leg muscle power is needed to produce a good jump. To increase leg muscle power, one of the exercises is pliometric exercises. The thing that needs to be considered in increasing vertical jump training is the development of explosive power(Hansen & Kennelly , 2017).

The plyometric training method is an exercise method that can be used to improve the biomotor freshness of athletes, including strength and speed which has a very wide application in sports activities. In particular, this exercise is very beneficial for increasing power.(Diyono et al., 2013) There are several kinds of pliometric exercises, the forms of pliometric exercises that will be studied in this study are squat jump and double leg bound. Pliometric squat jump exercises can strengthen leg muscle endurance and body balance. While double leg bound exercises are exercises to develop leg and hip muscle power.

Plyometric exercises help develop the entire neuromuscular system for power movements, not just contracting tissues. The (de Villarreal et al., 2010)plyometric exercise program should be given more recessive, temporal and special weights. The exact excess load is determined by controlling the height of the athlete's descent or fall, the load used and the distance traveled. Improper overload can interfere with the effectiveness of exercise or even cause injury. (Zubac et al., 2019)

The different types and varieties of *plyometric* exercises designed and the understanding *of the neuromuscular* processes involved, allow us to develop useful *plyometric* exercises. However, it is not practical to analyze every movement of sports skills and every stimuli of this exercise for the sport performed. Coaches and athletes are expected to know which training is better or right for their achievement needs.

Physical condition is an important element to achieve achievements. Physical condition is related to posture, because having a good posture, body structure and physique is one of the supporting things that are very important for someone to become an athlete (Hardiansyah, 2018). To become an athlete is not only based on high interest, but must meet certain conditions such as motor, somatic, and good body

or physical size so that the desired achievement can be achieved.Click or tap here to enter text.(Rachmalia et al., 2022)

Extracurricular activities at SMP N 3 Karanganyar really motivate students in moving and channeling talents in the world of sports. One of the extracurriculars that is in demand at SMP N 3 Karanganyar is volleyball. Researchers made observations and conducted interviews and observations to physical education teachers as volleyball extracurricular coaches with the results of exercises carried out twice a week on Tuesday and Thursday. The exercise that has been done is a jumping exercise up and down stairs. But in the process of training has not been done with a structured exercise program. The results found limb *muscle power* is still weak.

The plyometric *training method* has never been used in extracurricular coaching at SMP N 3 Karanganyar. The use of proper and correct *plyometric* training methods will increase strength and speed in performing basic volleyball techniques. From *the plyometric* exercise method, especially *squat jump* and *double leg bound exercises,* it is estimated to have an influence on *leg muscle* power.

METHOD

This research will be carried out in the courtyard of SMP Negeri 3 Karanganyar, Jalan Lawu No. 86, Ngarjosari, Karanganyar Regency, Central Java.

The experimental method is chosen to determine certain symptoms through the treatment carried out on the experimental sample. An experiment is a pattern that allows researchers to simultaneously study the influence of two or more types of experimental variables

A factorial experiment is an experiment that involves a number of factors of many levels. In this study, the experimental design was with two factors, each of which consisted of two levels. A factor is combined or crossed with all levels of each factor in the experiment. In factorial design two or more variables are manipulated simultaneously to determine the influence of each on the dependent variable, in addition to the influence caused by interactions between variables. The form of factorial design of this study can be described in the label matrix as follows:

Table 1. 2 x 2 factorial research design

Exercise / *Plyometric* / Gender	Plyometric *exercises*	
	Squat jump (A1)	*Double leg bound* (A2)
Male (B1)	A1B1	A2B1
Woman (B2)	A1B2	A2B2

Information:

A1B1 :exercise *Squat jump* with a group of male students.

A2B1 : exercise *Double Leg Bound* with a group of male students.

A1B2 :exercise *Squat jump* with a group of female students.

A2b2 :exercise *Double Leg Bound* with female students.

This research will be carried out for six weeks starting on February 5, 2024 to March 16, 2024 with a frequency of meetings three times a week on Monday, Wednesday and Friday. As for the reason it is done three times a week that learning three times per week will provide an opportunity for the body to adapt to the load received.

The meeting will be held outside school hours, namely in the afternoon at 15.30 – 17.00 WIB, with the aim of not disturbing the teaching and learning process. Overall, the treatment activities lasted for 18 meetings.

RESULTS AND DISCUSSION

The purpose of this study can be achieved by taking data on a predetermined sample. In this study to determine the increase in height achievement in volleyball games with squat jump training and double leg bound exercises. The summary of the results of the overall data analysis is presented in the form of a table.

Table 2. Descriptive statistics based on treatment

Treatment		N	Minimum	Maximum	Mean	Std. Deviation
Squat jump	Pretest	20	215	241	224,05	8,0097
	postes	20	221	246	229,75	7,84639
	difference	20	5	7	5,7	0,7327
Double Leg Box Bound	Pretest	20	207	219	212,85	3,28113
	postes	20	213	225	218,85	3,3289
	difference	20	4	12	6	1,65434

The results of descriptive statistical testing in the table above show that the average value of the high pretest achievement in the squat jump exercise was 224.05 with a standard deviation value of 8.0097. The high pretest mimumum score in the squat jump exercise was 215 and the maximum score was 241.

The results of descriptive statistical testing in the table above show that the average value of high postes achieved in squat jump training is 229.75 with a standard deviation value of 7.84639. The high postes mimumum score in the squat jump exercise was 221 and the maximum value was 246.

The results of descriptive statistical testing in the table above show that the average value of the difference in achievement height in squat jump training is 5.7 with a standard deviation value of 0.7327. The high difference in the squat jump exercise is 5 and the maximum value is 7.

The results of descriptive statistical testing in the table above show that the average value of the high pretest achievement in the double leg bound exercise was 212.85 with a standard deviation value of 3.28113. The high pretest mimumum score in the double leg bound exercise was 207 and the maximum value was 219.

The results of descriptive statistical testing in the table above show that the average value of high postes achieved in the double leg bound exercise was 218.85 with a standard deviation value of 3.3289. The high postes mimumum score was achieved in the double leg bound exercise of 213 and the maximum value was 225.

The results of descriptive statistical testing in the table above show that the average value of the high difference in achievement in the double leg bound exercise is 6 with a standard deviation value of 1.65434. The high difference in the double leg bound exercise is 4 and the maximum value is 12 .

The comparison of the increase between the two needs to be observed using statistical tests that the author will describe in a separate sub-chapter.

Table 3. Reliability test table

No	Variable	Alpha Cronbach	Test
1	Pretest	0,974	Reliable
2	postes	0,995	Reliable

Reliability test results of pretest and postes questionnaires. calculated by the Cronbach Alpha Coefficient formula, the R-count values are 0.974 and 0.995, respectively. A questionnaire is said to be reliable if the r-count value > 0.60. The results of reliability calculations show that both have a calculated r value of > 0.60. Based on the above criteria, it can be concluded that the questionnaire pretes and postes. declared reliable.

In the observation of the squat jump treatment group, an average increase of 5.70 was obtained, while in the double leg bound treatment, the average increase in height was 6.00. When compared with the two, it was concluded that the increase in the double leg bound treatment group increased the height of the achievement greater than the squat jump treatment group. The calculation results using the anova test obtained a probability value of 0.436. Probability value = 0.436 > 0.05 which means there is no significant difference between the squat jump treatment group and the double leg bound treatment group.

Based on the average comparison and statistical test results, it was concluded that there was no significant difference in the height increase of the squat jump treatment group with double leg bound. So hypothesis 2 is rejected.

In the squat jump treatment group after analysis, a high increase in achievement between pretests and postes was obtained by 5.7 with a percentage of 2.544%. Meanwhile, in the double leg bound treatment group, after analysis, a high increase in achievement between pretests and postes was obtained by 6 with a percentage of 2.819%. When compared to the two, the increase in double leg bound treatment has a higher percentage of success than the squat jump treatment. That is 2.819% versus 2.544%. So that the double leg bound treatment is better than the squat jump treatment.

The calculation is statistically obtained F count of 0.621 with a probability of 0.436. The probability > 0.05 which means there is no significant difference in height increase between the squat jump treatment group and the double leg bound. So that hypothesis 1 "there is a difference in height increase in volleyball games in SMP Negeri 3 Karanganyar students between squat jump treatment and double leg bound", was rejected

Hypothesis 1 rejected does not mean that there is no difference in height increase between squat jump treatment and double leg bound but double leg bound treatment is slightly better. In addition, both treatments were stated to increase the achievement height significantly.

CONCLUSION

There was no significant difference in height increase between the squat jump and double leg bound treatment groups. Evidenced by the average increase in the squat jump treatment group by 5.7 (2.544%) while in the double leg bound treatment group by 6 (2.819%). As well as the results of the statistical test of the anova test obtained a probability value of 0.436> 0.05.

REFERENCES

Adnan, A., & Amin, H. (2020). Studi Tentang Beberapa Komponen Kondisi Fisik Atlet Bola Voli Smk Negeri 1 Kota Solok. *Jurnal Patriot*, *1*, 266–277.

Aguss, R. M., Fahrizqi, E. B., & Wicaksono, P. A. (2021). Efektivitas vertical jump terhadap kemampuan smash bola voli putra. *Jurnal Pendidikan Jasmani Indonesia*, *17*(1), 1–9. https://doi.org/10.21831/jpji.v17i1.38631

de Villarreal, E. S. S., Requena, B., & Newton, R. U. (2010). Does plyometric training improve strength performance? A meta-analysis. *Journal of Science and Medicine in Sport*, *13*(5), 513–522. https://doi.org/10.1016/j.jsams.2009.08.005

Diyono, Rahayu, umi budi, & Rosella, D. (2013). *Pengaruh Plyometric Exercise Chest Pass Terhadap Daya Ledak Otot Lengan Pada Pemain Basket SMP Negeri 26 Surakarta*.

Douglas, J., Ross, A., & Martin, J. C. (2021). Maximal muscular power: lessons from sprint cycling. In *Sports Medicine - Open* (Vol. 7, Issue 1). Springer Science and Business Media Deutschland GmbH. https://doi.org/10.1186/s40798-021-00341-7

Hansen, D., & Kennelly, S. (2017). *Plyometric anatomy*. Human Kinetics.

Hardiansyah, S. (2018). Kondisi Fisik Adalah Salah Satu Prasarat Yang Sangat Diperlukan Dalam Setiap Usaha Peningkatan Prestasi Seorang Atlet, Bahkan Dapat Dikatakan Dasar Landasan Titik Tolak Suatu Awalan Olahraga Prestasi. *Jurnal Menssana*, *3*(1), 117–123.

Ismoko, A. P., & Sukoco, P. (2013). Pengaruh metode latihan dan koordinasi terhadap power tungkai atlet bola voli junior putri. *Jurnal Keolahragaan*, *1*(1), 1–12.

Iyakrus, I. (2019). Pendidikan Jasmani, Olahraga Dan Prestasi. *Altius : Jurnal Ilmu Olahraga Dan Kesehatan*, *7*(2). https://doi.org/10.36706/altius.v7i2.8110

Oktariana, D., & Hardiyono, B. (2020). Pengaruh Daya Ledak Otot Lengan, Daya Ledak Otot Tungkai Dan Kekuatan Otot Perut Terhadap Hasil Smash Bola Voli Pada Siswa SMK Negeri 3 Palembang. *Journal Coaching Education Sports*, *1*(1), 13–24. https://doi.org/10.31599/jces.v1i1.82

Palar, C. M., Wongkar, D., & Ticoalu, S. H. R. (2015). Manfaat latihan olahraga terhadap kebugaran fisik manusia. *Jurnal E-Biomedik*, *3*(1). https://doi.org/10.35790/ebm.3.1.2015.7127

Pranopik, M. R. (2017). PENGEMBANGAN VARIASI LATIHAN SMASH BOLA VOLI. *Jurnal Prestasi*, *1*(1).

Rachmalia, D. S., Susilawati, D., & Lengkana, A. S. (2022). Profil Kondisi Fisik Atlet Bola Voli Pada Klub Tectona Kota Bandung. *Journal of SPORT (Sport, Physical Education, Organization, Recreation, and Training)*, *6*(2), 91–100. https://doi.org/10.37058/sport.v6i2.6375

Suarez, L. Y. T. (2015). *HUBUNGAN TEKNIK SERVIS FLOAT TANGAN ATAS, GERAKAN BOLA, TINGGI BOLA DI ATAS NET, DENGAN KETEPATAN HASIL SERVIS PADA ATLET BOLA VOLI SENIOR DI PERKUMPULAN YUSO SLEMAN*. *1*, 1–27.

Yono, T., & Sodikin, F. A. (2020). Modifikasi Bola Plastik sebagai Media Pembelajaran Bola Voli. *SPARTA*, *2*(2), 26–31. https://doi.org/10.35438/sparta.v2i2.170

Zubac, D., Paravli, A., Koren, K., & Felicita, U. (2019). Plyometric exercise improves jumping performance and skeletal muscle contractile properties in seniors. *Musculoskeletal and Neuronal Interactions*, *19*(1), 38–49