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The Effect of Stair up and down Training on Jump Height and Smash Point Obtainment in Male Volleyball Athletes

Milla Hamma Azzahroh[1*] , Fajar Syamsudin[1]

[1,2] Sports Science Study Program, Faculty of Sports Sciences, Universitas Negeri Semarang, Jalan Sekaran, Kec. Gn. Pati, Kota Semarang, Jawa Tengah 50229, Indonesia

Corresponding author: millahamma@students.unnes.ac.id

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Abstract: Smash is one of the key in volleyball. To be master smash technique, strong leg muscles are needed. This study aims to determine the effect of training up-down stairs on the height of smash jump and the acquisition of smash points in volleyball athletes. The research design uses the design of one pretest-postest group. With a quantitative approach and experimental method. The sample are 10 male volleyball athletes of SMA Negeri 1 Bandar, selected using total sampling. The instruments used were vertical jump tests and smash tests. Data analysis technique uses the t-test. The results showed a significant effect on the practice of going up-down stairs on the jump height; There is an effect of training up-down stairs on the smash points. With t-test results vertical jump value sig. (2-tailed)=0.000 and t-calculate=27,650 and the results of the t-test are smash results, the value of sig. (2-tailed) =0.000 and t-count = 10.984. The conclusion is shows that there is a significant increase in the height of smash jump and the acquisition of smash point. For trainers can provide training to improve jump height. For athletes, they can train their leg muscles to increase jump height.

Keywords: Volleyball; Leg Muscle Explosiveness; Vertical jump; Plyometric exercises

INTRODUCTION

Volleyball is a sport that is loved by all levels of Indonesian society. This sport can be played from the level of children to adults, both men and women. Volleyball was originally a game that was carried out as a mere "fad". The possibility of developing into a popular sport that is popular today (Dwi Maya Abdiliah et al., 2022). Currently, volleyball is a trending topic, especially with the presence of Indonesian female athletes who are currently under contract at the South Korean volleyball club Daejon Cheong Kwan Jang Red Sparks. Megawati, one of Indonesia's mainstay players, performed brilliantly on the field and won the MVP for the second time in the 2023 South Korean Volleyball League. He is a player with a good jump smash. Smash is one of the determinants of victory in the game. To master a good smash technique requires more practice (Hidayat & Muhaimin, 2020) .

Achievement sports are sports that foster and develop athletes in a planned and sustainable manner through competitions to achieve achievements supported by sports science and technology (Muhammad et al ., 2016). High volleyball achievements require serious achievement coaching from an early age (Maula & Amrulloh, 2024). Regular and continuous volleyball training for mastering basic techniques so that they can be mastered perfectly (Rahmawati et al., 2024). Good training methods need to be known for mastering basic techniques and physical conditions that can be achieved optimally (Riyanto & Mulyana, 2023).

Volleyball requires good physical ability support to support the implementation of basic techniques in the game. Therefore, physical training can be used to provide an impact on the body's ability because of the stimulation in the form of a training response that is carried out repeatedly during certain sports activities (Tapo, 2019). Stimulation in volleyball is more dominant in the physical condition of the hands and feet (Yulifri et al., 2018). Physical condition is a complete unity of components that cannot be separated either in terms of improvement or maintenance. Which means that in an effort to improve physical condition, all components must be developed according to the priority of the conditions needed. The elements in physical condition are: strength, endurance, muscle explosive power, speed, agility, flexibility, balance, coordination, accuracy, reaction (Nasuka, 2016). This can be applied, one of which is by doing stair climbing exercises that affect volleyball smash jumps (Saputra et al., 2024).

Plyometric training can increase muscle explosive power by combining the use of sudden strength and speed before the muscles contract again or an exercise that allows the muscles to achieve maximum strength in the shortest possible time (Dimas Anggara, 2019). Jumping for volleyball athletes is very important, especially for the smash position. Jumping is an inseparable part of volleyball, both as an effort to attack and defend (Alkalah, 2016). In volleyball, the front player is required to have a high jump. A tall posture can also help the height of the jump, but there must also be physical training that helps the jump to be higher (BURHANUDIN & Fauzi, 2019).

The success of a person to make a leap is influenced by many factors, both internal and external factors. Internal factors include running speed, strength when resisting, body posture in the air, and landing, while external factors are wind speed and gravity and the field conditions themselves (Mohammd Fathan Mubina et al., 2021). Leg muscle explosive power is a physical condition that supports good smash mastery where leg muscle explosive power helps athletes make high jumps sports. Large leg muscles will produce maximum jumps. A volleyball player is required to have the highest possible jump to spike (Gilang Noviansyah et al., 2023). Leg muscles consist of large muscles located in the thighs and calves (Mardela, 2019) .

In training jump height, there are several effective ways, for example, by practicing going up and down stairs so that athletes can increase their jump height (Fakhruddin et al ., 2023). Stair climbing training is a form of plyometric training using equipment, namely several steps, to perform the movement, namely by running normally to the top step, usually 10-20 steps, then running back down to the bottom step, and repeated until the limit and portion of the training performed. Stair climbing training is a movement to change horizontal momentum to vertical by trying to achieve movement efficiency to reach sufficient height (Pratama & Wahyudi, 2022).

Up and down exercises are very important to train the height of volleyball athletes' jumps. Jump height is very important for volleyball athletes, especially front players, smashers and blockers (Amrullah et al ., 2021). Going up and down stairs is useful for leg muscle power in high jump abilities (Putri et al ., 2022). Stair climbing is a common daily physical activity and is known to activate the knee extensor muscles to a greater extent than walking (Hayao Ozaki1, 2019). The stair-climbing training program has been

proven to improve vertical jump performance, which directly influences the effectiveness of spike jumps in volleyball (Evelien et al., 2025).

In previous research written by Lucky Pratama, it was concluded that there was a significant effect of stair climbing training on the height of the jump in volleyball athletes at the Tunas Club, Tegal Regency (Pratama & Wahyudi, 2022). Also in the research written by M Khayi Khayat, there was a significant effect of stair climbing training on the accuracy of the smash at the Arteg Sumber Beras Muncar Club, Banyuwangi Regency (Mahdi, 2017). And in the research written by Khatarina Kleden, it was concluded that there was a significant effect of stair climbing training on the height of the smash jump at the Arteg Sumber Beras Muncar Club, Banyuwangi Regency (Kleden et al., 2021).

The research written by Galang Aulia concluded that there was a significant effect of stair climbing training using one foot or two feet on the height of the smash jump of volleyball players at SMPN 1 Jatiwaras. In a study written by Evrida P, it was concluded that there was a significant influence of stair climbing training for leg muscle power strength on the jump height of male volleyball athletes at the PST City of Bengkulu club (Putri et al., 2022). From several previous studies, it was interpreted that there was an influence of stair climbing training on jump height and volleyball smash point acquisition. In the results of observations conducted at the extracurricular activities of SMA Negeri 1 Bandar, physical condition training such as leg muscle power is still rarely done because it seems boring. This is because playing live games or tactical training is more interesting than doing physical condition training (Ghofar, 2020).

Based on the description above, the researcher conducted a study to improve the ability in jumping height and smash point acquisition in athletes using the stair climbing training method. The objectives of this study are 1). Knowing whether there is an effect of training up and down stairs on the height of the smash jump in male volleyball athletes of SMA Negeri 1 Bandar. 2). Knowing whether there is an effect of training up and down stairs on the acquisition of smash points in male volleyball athletes of SMA Negeri 1 Bandar.

METHODS

Type of research uses a quantitative approach to the experimental method, The research design uses the design of one pretest-postest group. In this study, the subject is

volleyball athletes from SMA N 1 Bandar. With 10 volleyball athletes for population. The sampling technique is by total sampling, namely using the entire sample (Sugiyono, 2018). Participant character of sample is; volleyball extracuricural athletes, 16-17 old, student of SMA N 1 Bandar. Research instrument used was a vertical jump test and a smash test on samples that underwent treatment for 2 months with 16 meetings. The exercises given were stair climbing exercises with 10 steps with a height of 40 cm with 3 repetitions at low, medium and high speeds.

Data analysis in this study used quantitative data analysis in 3 ways, namely descriptive statistics, normality tests and homogeneity tests, and drawing conclusions with the T-test.The result of Normality Test in vertical jump test is Sig= 0,200 (pre-test and post-test) and since 0,200>0,05 it was concluded that data was normally distributed. The result of Normality Test in smash test is Sig= 0,051 (pre-test), 0,200 (post-test) and since 0,051>0,05 (pres-test) 0,200>0,05 (post-test) it was concluded that the post test data was normally distributed. The result of Homogenity Test in vertical jump test is Sig= 0,517 and since 0,517>0,05 then the data was come from homogeneous data. The result of Homogenity Test in smash test is Sig= 0,645 and since 0,645>0,05 then the data was come from homogeneous data

Table 1. Sample Data

Samplle	**Age**	**Height**	**Weight**
A1	16	170	61
A2	16	171	69
A3	16	170	50
A4	16	168	61
A5	16	164	63
A6	16	168	54
A7	16	169	56
A8	16	168	57
A9	16	157	46
A10	16	160	48

This study has 3 variables, 1 independent variable and 2 dependent variables. The independent variable is stair climbing practice and the first dependent variable is the height of the smash jump and the second variable is the acquisition of smash points .

RESULTS AND DISCUSSION

Pre-test and post-test with data collection using vertical jump test and test. Based on the results of measurements carried out before and after stair climbing exercises for 16 meetings, as in tables 1 and 2.

Table 2. Description of pre-test and post-test vertical jump test results data

	N	Min	Max	Mean	Std. Deviation
Pre-test	10	45	69	55.9	8.530
Post-test	10	48	76	60.1	10.159

From the table data above, the pre- test aims to see the initial condition of students before being given treatment, and the post-test aims to see t-he final condition of students after being given stair climbing exercises. Pre-test data obtained with the highest value of 69 and the lowest 45 with an average of 23.13 . Post-test data with the highest value of 76 and the lowest 48 with an average of 60.10

Table 3. Description of pre-test and post-test smash test results data

	N	Min	Max	Mean	Std. Deviation
Pre-test	10	11	60	32.9	13.453
Post-test	11	28	85	50.0	16.055

From the table data above, the pre- test aims to see the initial condition of students before being given treatment, and the post-test aims to see the final condition of students after being given stair climbing exercises. Pre-test data obtained with the highest value of 60 and the lowest 11 with an average of 32.90 . Post-test data with the highest value of 85 and the lowest 28 with an average of 50.00. In the results of the analysis of the requirements test for variables X1 and X2, a normal and homogeneous distribution was obtained, so for the next test, namely the t-test, as in Table 3 and Table 4.

Table 4. Results of vertical jump test calculations with One Sample test

t		df	Sig. (2-tailed)	Mean Difference
Vertical jump test result	27.65	19	0.000	58.000

From the data above, the Sig value (2-tailed) = 0.000, then the probability of 0.000 <0.05 means that there is an increase in results with stair climbing exercises . So that there is a difference between before and after.

Table 5. Results of smash test calculations with One Sample test

t		df	Sig. (2-tailed)	Mean Difference
Smash test result	10.984	19	0.000	41.450

From the data above, the Sig value (2-tailed) = 0.000, then the probability of0.000 <0.05 means that there is an increase in results with stair climbing exercises. So that there is a difference between before and after.Based on the research results, it can be concluded that the exercises provided in this study, namely stair climbing exercises aimed at increasing jump height during a smash, have proven to be effective.

The result above show that this study reaffirms that stair climbing exercises have an effect on jump height and smash, as in previous studies by practicing going up and down stairs, the muscles around the thigh joints are trained, namely the quadriceps hamstring, and calf muscles (PUTRI, 2022) . Stair climbing exercises that rely on muscle contractions used in the leg push-off movement, arm swings and landing positions can increase the explosive power of the leg muscles (Achmad ZinaT Irfan, 2016). In the study, to obtain a good training effect during 16 meetings, increasing loads were given, where in each subsequent training session the speed of the stair climbing exercise was increased.

CONCLUSION

Method for 8 weeks with 16 meetings had asignificant effect on increasing the jump height and smash point acquisition in male volleyball athletes at SMA Negeri 1 Bandar. (Rodrigo et al., 2020) found that Plyometric Jump Training significantly enhances vertical jump height performance in volleyball players. Stair-climbing exercises, when integrated with weight training, can provide greater improvements in vertical jump height through enhanced leg strength and power output (Konstantinos Sotiropoulos 1, 2022). Volleyball coaches of SMA Negeri 1 Bandar should be able to provide training with various variants, one of which is going up and down stairs which is done gradually and increasing, so that it can have a significant impact on increasing the results of smash jumps and smash points for male volleyball athletes of SMA Negeri 1

Bandar. Suggestions For researchers, it can be used as a scientific study and consideration in further research.

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