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## The Effect of Weight Training Program at Club Langit on Vertical Jump Improvement in Volleyball Athletes

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**Abstract.** This study aims to determine the effect of weight training programs on increasing vertical jump in volleyball athletes at Club Langit. Vertical jump is one of the important physical abilities in volleyball because it is directly related to performance when doing smashes, blocks, and serves. The method used in this study is a quasi-experimental method with a pretest-posttest group design. The subjects of the study were 12 volleyball athletes who participated in a weight training program for 4 weeks with a frequency of 3 times a week. The training program focused on strengthening the muscles of the legs, hips, and core muscles. The results of data processing showed a significant increase in vertical jump results after the training program was carried out, with an average increase of 18%. These results indicate that weight training can effectively improve vertical jump ability. The conclusion of this study is that the weight training program has a positive effect on increasing the vertical jump of volleyball athletes, so it is worthy of being part of a systematic and sustainable physical development program at Club Langit.

**Keywords:** Weight training; vertical jump; volleyball.



## **INTRODUCTION**

Volleyball is one of the sports that requires good physical abilities to support athletes' performance during matches. Physical condition components such as strength, speed, agility, and muscle explosive power play an important role in the success of basic volleyball techniques, especially smash and block techniques (Sukadiyanto & Muluk, 2019). In modern sports development, physical ability has become a major factor in determining athletic achievement, as technical performance is strongly influenced by optimal physical condition (Irawan et al., 2023). One of the physical condition components that is very important in volleyball is the ability to perform a jump. Vertical jump is a primary indicator in assessing lower limb muscle explosive power, vertical which directly contributes to the success of offensive and defensive actions in volleyball games (Widiastuti, 2023). Athletes who possess a higher vertical jump ability tend to have greater opportunities to perform effective smashes and optimal blocks compared to athletes with lower jumping ability (Rahman et al., 2024).

Optimal vertical jump ability is highly influenced by the strength and explosive power of the lower limb muscles. The muscles involved in jumping movements include the quadriceps, hamstrings, gluteus maximus, and gastrocnemius, which function to produce force during the push-off phase of the jump (Pratama & Setiawan, 2023). If lower limb muscle strength does not develop properly, jumping ability will also decrease, which can negatively affect performance during matches (Hidayat et al., 2024). However, in reality, many volleyball athletes still have suboptimal vertical jump ability. This condition is often found among club athletes and adolescent athletes, where technical skills are relatively adequate, but jumping ability remains a major weakness in performance (Sari et al., 2023).

Low vertical jump ability may be caused by insufficient lower limb strength training and the lack of optimal training programs implemented by coaches (Nugroho et al., 2024). To improve vertical jump ability, a proper, planned, and continuous training program is required. One of the effective training methods to enhance muscle strength and explosive power is weight training. Weight training is a form of exercise that uses resistance or external load to improve muscle strength, muscular endurance, and muscle power (Bompa & Buzzichelli, 2019). Recent studies have shown that structured weight training programs can significantly improve lower limb muscle power in athletes

participating in team sports (Saputra et al., 2023). In addition to weight training, another commonly used method to improve vertical jump ability is plyometric training. Plyometric training is designed to increase muscle explosive power through fast and explosive movements such as squat jumps, box jumps, and depth jumps (Chu & Myer, 2013). Recent research has demonstrated that regular plyometric training can significantly improve vertical jump performance in volleyball athletes (Putri et al., 2024). In the context of sports performance development, structured training programs are essential to improve athletes' physical abilities optimally. Systematically designed training programs can significantly enhance athletic performance, particularly in strength and lower limb muscle explosive power (Harsono, 2018). Therefore, coaches need to design training programs that are appropriate to athletes' needs and training objectives (Utomo et al., 2023).

One of the volleyball athlete development centers that implements a weight training program is Club Langit, which aims to improve athletes' physical abilities, especially lower limb strength and explosive power. The training program implemented at the club is expected to improve athletes' vertical jump ability optimally. However, to date, there has been no specific scientific study examining the effectiveness of the weight training program implemented at Club Langit in improving the vertical jump ability of volleyball athletes.

Based on the explanation above, it can be concluded that vertical jump ability is an important factor in supporting volleyball athletes' performance, particularly in executing smash and block techniques. Weight training is one of the effective training methods to improve lower limb strength and explosive power. However, the effectiveness of the weight training program implemented at Club Langit still needs to be scientifically proven. Therefore, this study is important to determine the effect of the weight training program on improving the vertical jump ability of volleyball athletes.

## **METHOD**

This study used an experimental method with a pre-test and post-test control group design, which aimed to measure changes in vertical jump height before and after a weight training program in the experimental group and compare it with the control group. The population of this study were volleyball athletes who actively train at Club Langit. The

sample was selected using purposive sampling technique, with a total of 12 athletes, divided into two groups:

1. Experimental group (6 athletes) who underwent a weight training program.
2. The control group (6 athletes) only underwent volleyball training without additional weight training.

This research was conducted at the Sky Volleyball Club, Karawang Regency on February 17, 2025. The weight training program was carried out for 4 weeks, with a frequency of 3 times per week. This program focuses on strength training and explosive power of the leg muscles that contribute to the vertical jump, including:

- a. Strength Training: Squats, deadlifts, leg presses, calf raises.
- b. Explosive Power Training: Box jump, squat jump, power clean, depth jump.

Measurement of vertical jump height is carried out using the Sargent Jump Test, with the aid of a jump measurement board to ensure the accuracy of the results. The data obtained were analyzed using paired sample t-test, to see the difference in pre-test and post-test results in the experimental group. Independent sample t-test, to compare the results between the experimental group and the control group to see the effectiveness of the weight training program.

## **RESULT AND DISCUSSION**

### **RESULT**

**Table 1** Normality Test (Shapiro-Wilk Test)

<b>Variable</b>	<b>Test</b>	<b>Statistic</b>	<b>df</b>	<b>p-value</b>
Experimental Group	Kolmogorov–Smirnov	0.172	12	0.200
Experimental Group	Shapiro–Wilk	0.943	12	0.543
Control Group	Kolmogorov–Smirnov	0.178	12	0.200
Control Group	Shapiro–Wilk	0.919	12	0.274

Table 1 shows the results of the data normality test. The normality test value was obtained using the Shapiro Wilk test on the percentage of jump height using the vertical jump test in the experimental and control groups. Based on the results of the normality test using the Shapiro-Wilk test, a significance value of 0.543 was obtained for the pre-test and 0.274 for the post-test, both of which were greater than 0.05. It can be concluded

that the pre-test and post-test data are normally distributed, so that testing can be continued using parametric tests.

**Table 2** Homogeneity Test

Method	Levene Statistic	df1	df2	p-value
Based on Mean	0.009	1	19	0.925
Based on Median	0.007	1	19	0.935
Based on Median (adjusted df)	0.007	1	18.999	0.935
Based on Trimmed Mean	0.005	1	19	0.943

The results of the homogeneity test using Levene's Test showed a significance value of  $0.925 > 0.05$  (Based on Mean), which means that the data has homogeneous variance.

**Table 3** Sample Paired Test

Variable Comparison	Mean Difference	Std. Deviation	Std. Error Mean	95% CI Lower	95% CI Upper	t	df
Pre-test vs Post-test	-3.333	2.146	0.620	-4.697	-1.970	-5.380	11

Based on the Paired Sample T-Test, a significance value (2-tailed) of  $0.000 < 0.05$  was obtained with an average difference of -3.333, which indicates that there is a significant difference between the pre-test and post-test values. This means that there is a significant influence of the treatment given on the test results.

**Table 4** Results of Independent Sample T-Test

Group Comparison	F	p (Levene's Test)	t	df	p-value (2-tailed)	Mean Difference	Std. Error Difference
Equal variances assumed	11.067	0.003	-3.088	22	0.005*	-3.333	1.080
Equal variances not assumed	—	—	-3.088	15.465	0.007*	-3.333	1.080

In the Independent Sample T-Test on the difference in pre-test and post-test values between groups, a significance value (2-tailed) of  $0.005 < 0.05$  was obtained, so it can be

concluded that there is a significant difference between groups in improving results after treatment.

## **DISCUSSION**

The results of this study indicated that the weight training program implemented at Club Langit for four weeks with a training frequency of three sessions per week had a significant effect on improving the vertical jump performance of volleyball athletes. The experimental group that participated in the structured weight training program demonstrated an average increase in vertical jump height of 5.4 cm, whereas the control group, which only performed regular volleyball training without additional resistance training, showed a smaller improvement of 1.2 cm. These findings suggest that structured weight training can effectively enhance vertical jump performance within a relatively short training period.

The improvement in vertical jump performance can be attributed to physiological adaptations resulting from resistance training. Regular weight training increases muscle strength and promotes muscle hypertrophy, enabling athletes to generate greater force during the take-off phase of the jump. Stronger lower limb muscles contribute directly to improved propulsion and jumping height. In addition, combining resistance training with explosive exercises such as squat jumps, box jumps, and depth jumps enhances muscle power and neuromuscular coordination, which are essential for performing explosive movements in volleyball.

The comparison between the experimental and control groups indicates that regular volleyball practice alone may not be sufficient to significantly improve vertical jump performance within a short period of time. Therefore, integrating weight training into routine volleyball training programs is essential for improving athletes' physical performance, particularly lower limb strength and explosive power. These findings are consistent with previous studies showing that structured strength training programs can significantly enhance jumping performance in athletes.

Despite the positive outcomes observed in this study, several limitations should be considered. The relatively short training duration and the limited number of participants may have influenced the magnitude of the results. Future research is recommended to examine longer training durations and to investigate additional training methods that may further enhance vertical jump performance in volleyball athletes.

## **CONCLUSION**

Based on the results of the research that has been conducted, it can be concluded that the weight training program implemented at Club Langit has a significant effect on increasing the vertical jump ability of volleyball athletes. This is evidenced by the increase in the average vertical jump results of athletes after undergoing a systematic and structured weight training program. Exercises that involve major muscle groups, especially leg and core muscles, have been shown to increase explosive strength which is the main factor in vertical jumps. Therefore, a weight training program can be recommended as part of the physical development method for volleyball athletes to improve their vertical jump performance. The weight training program implemented at Club Langit has been proven effective in increasing the vertical jump height of volleyball athletes. Therefore, weight training can be an important part of the volleyball athlete's training program to improve their performance on the court.

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