



Effects of Six-Week Plyometrics on Vertical Jumping Ability of Volleyball Players

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Abstract

The study was designed to find the six-week Plyometrics effect on vertical jumping ability of state level Volleyball players. Total twenty (n=20) Volleyball players of Amritsar district were selected. Vertical jumping ability was dependent variable and Plyometric training was independent variable. Two groups were made by dividing subjects randomly, Experimental group (E; n =10) and Control group (C; n=10). Experimental group was given six week Plyometric training treatment while control group participated only their routine program. For the data collection, Sargent jump test was used. Pre-test and post-test were taken. To analyze data, t-test was used to test the effect of Plyometric treatment at 0.05 significance level. The outcomes of study reveals that in Experimental group, the difference was statistically significant but no significant difference found between means of control group. Conclusion: Identification of Plyometric training program as more beneficial and effective than general training program and have more positive effect on vertical jump performance.

Keywords: Vertical jumping ability, plyometric training, sargent jump.

Introduction

Volleyball is a game which relies heavily on explosive power of legs for attaining maximum height of jumping. Vertical jumping ability is the product of muscular strength and muscular speed. The ability to produce explosive lower body power of a player can be an important factor for attaining maximum height of vertical jump. Specific training method is required to improve the vertical jumping ability of players.

Plyometrics exercises should be done swiftly to achieve the highest muscular power and explosiveness. Plyometrics educate the muscles to pre-stretch prior to jumping. Pre-stretching led the muscles to store potential energy in them that aids to jump higher. For instance, when counter movement is executed earlier to jumping, elastic energy is stored in soleus and medial gastrocnemius muscles¹.

The plyometric exercise train the fast muscle fibers and the nerves activate them as well as reflex hence it is one of the primary tool which enhance both i.e strength and speed. In plyometric method all the drill or activities the aim of which is to enhance the explosive reaction of player through powerful muscular contractions. Enhancement of explosive reaction takes place as a result of rapid eccentric contractions. Previous researches have validated that the enhancement of vertical jump can be achieved with plyometrics if used with proper periodized strength-training program²⁻¹⁴. Vertical jump test measures overall leg explosiveness which is largely a function of muscle fiber type in legs.

Methodology

The study involved a group of 20 male subjects aged (17.8±1.50) state level volleyball players selected from Amritsar, Punjab, India. Subjects were grouped into two by using random technique, an experimental group (E; n=10) and a control group (C; n=10). Experimental group was treated with six-week plyometric training program (table 1) designed by the researcher while control group was only participated in their general routine program. Total 18 training sessions of plyometric training were organized for experimental group. Training volume was limited from 85 to 115 foot contacts per session whilst the exercise intensity was augmented for 5 weeks before abating in sixth week. The training intensity was diminished to lessen the fatigue and to beginning the recovery process before post-test. The training was given for three days in a week. Throughout the training phase, every subject was under expert's command and instructions were given for proper execution exercises.

Testing procedures: Two tests, a Pre-test before the treatment and Post-test after the six week treatment session were taken to measure the jumping ability of players. Sargent jump test was used as criterion measures; the standing highest hand reach was subtracted from the jump and highest reach of the subject. Data was recorded in centimeters.

Statistical analysis: The paired t-test was used to evaluate statistical difference at 0.05 significance level.

Results and Discussion

Results: Table-2 demonstrates the mean of vertical jumping test of pre-test of Experimental group was 52.7 and post-test of Experimental group was 57, while mean of vertical jumping test of pre-test of control group was 53.5 and post-test of Control

group was 53.8 in centimeters. The t-value of experimental group and control group was 12.84* and 1.41 respectively. After analyzing data, results reveals an extremely significant difference between pre-test and post-test of experimental group but no significant difference found between pre-test and post-test of control group.

Table-1
6-week plyometrics session protocol

Training week	Training volume (foot contacts)	Plyometric drill	Sets x reps	Training intensity
Week 1	85	Two foot ankle hops	2 x 15	Low
		Forward skip	2 x 15	Low
		Double leg vertical jump	5 x 5	Low
Week 2	110	Two foot ankle hops	2 x 15	Low
		Standing long jump	5 x 6	Low
		Lateral cone hops	2 x 15	Medium
		Double leg tuck jumps	2 x 10	Medium
Week 3	115	Two foot ankle hops	2 x 12	Low
		Standing long jump	4 x 6	Low
		Lateral cone hops	2 x 12	Medium
		Double leg tuck jumps	2 x 10	Medium
		Double butt kick	3 x 8	Medium
Week 4	105	Diagonal hops	4 x 8	Low
		Double tuck jumps	2 x 10	Medium
		Lateral cone hops	2 x 10	Medium
		Double leg butt kick	3 x 6	Medium
		Single leg vertical jump	3 x 5	High
Week 5	110	Diagonal cone hops	3 x 7	Low
		Standing long jump with lateral sprint	4 x 5	Medium
		Lateral cone hops	4 x 6	Medium
		Single leg bounding	2 x 5	High
		Front cone hops	2 x 10	Medium
		Depth jumps	3 x 5	High
Week 6	100	Diagonal cone hops	2 x 7	Low
		Hexagon drill	2 x 12	Low
		Double leg hops	3 x 8	Medium
		Lateral cone hops	3 x 8	Medium
		Depth jump	2 x 7	High

Table-2
Statistical analysis of Sargent jump test of Experimental and Control group

Group	Number	Mean	Standard deviation	t-ratio
Experimental(pre-test)	10	52.7	2.5	12.84*
Experimental(post-test)	10	57	2.83	
Control(pre-test)	10	53.5	3.06	1.41
Control(post-test)	10	53.8	3.05	

Significant at the level 0.05 df(9)=2.262

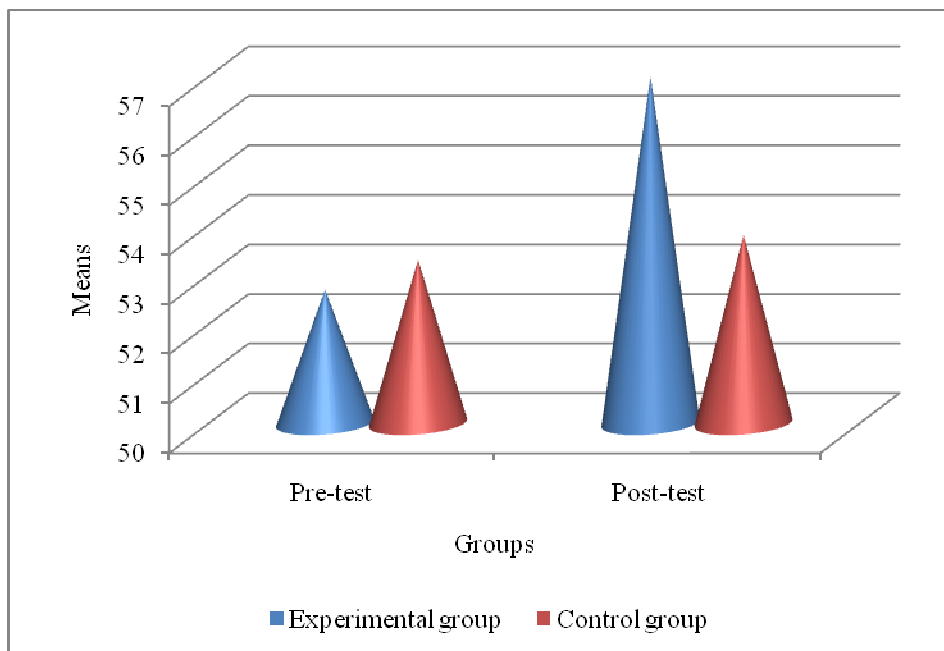


Figure-1
 Graphical representation of results in relation to Sargent jump test.

Conclusion

By finding significance difference in pre and post test of jumping ability, our results signify that the plyometric training enhanced vertical jumping measures because of better neural adaptation. Plyometric training method significantly enhances explosive power of lower extremity. This enhancement was due to some adaptive change in neuro-muscular functioning of body viz. improvement in nerve-based command to muscles of agonist group, improvement in intermuscular coordination, modification of muscle shape or size, changes in mechanism of single-fiber¹⁵, increase in the interaction of muscle fibers and tendinous tissue.

Due to these adaptive transformations, subjects who were treated with plyometric training were capable to increase their jumping ability significantly. As a result, a positive relationship between plyometric training and improvement in vertical jump was obtained. This study will be helpful to the volleyball players who require maximum jumping ability to achieve high performance.

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