



## EFFECTS OF PLYOMETRIC TRAINING ON THE EXPLOSIVE STRENGTH OF VOLLEYBALL PLAYERS

(Received on: 13 March 2015, Reviewed on: 03 April 2015 and Accepted on: 30 April 2015)

**Dr. Rajesh Dhauta**, Asst. Professor  
Amity University, Noida (U.P)

**Mr. Sachin Bura**, Physical Education Teacher  
Modern Vidhya Niketan School, Faridabad, Haryana



### Abstract

The purpose of this study was to evaluate the effects of plyometric training on the explosive strength lower extremity of the Junior State Volleyball player's. Twenty subjects were selected randomly from Faridabad Volleyball Association. The ages of the subjects were in the range of 16 to 19 years. All the subjects were given the same plyometric training which was given three days a week and alternate in days. The external conditions of all the subjects were almost similar as they practice in the same club and in the same environmental conditions. Pre-test and post-test were conducted for standing vertical jump and running vertical jump to measure the explosive strength of the lower extremities respectively. Paired 't' test was applied to find out the significant improvement among the means of the both the experimental and control group. Based on the findings obtained from the present study, Specific plyometric training for six week Improves significantly the explosive strength of lower extremity of the volleyball player's. Since, the present study was conducted on a specific plyometric training program and their effects on explosive strength of the junior volleyball player's.

**Keywords:** Muscle power, Performance, Conditioning and Plyometric Exercises

### Introduction

Plyometrics can be a great way to increase an athlete's muscular strength and their vertical jump. The term 'plyometrics' was initially introduced in 1975 by Fred Wilt, the American Track and Field Coach. In this the term ply means for "increase" and metric means "measure", so here the plyometrics means the "measurable increase". Plyometric training can be of many types, it includes the jumping exercises for the lower extremities and medicine ball exercises for the upper extremities especially. All the exercises jumping and medicine ball are progressive in nature, with a range of low to high intensity in each type of exercises. The Jumping exercises can be as; standing jump; bounding; box drills and depth jumps etc. Plyometric exercise has been advocated for sports that require power or strength and the ability to jump vertically. Plyometrics also recognized as jump exercise. It is a preparation method designed to enhance muscular power and explosiveness. Vertical jump ability is very essential for success in volleyball. Jump is performed during the whole game in volleyball like jump set, jump serve, blocking and spiking. It is not essential that an unbeaten competitor must only be able to jump high but must also be able to arrive at that height quickly is essential. This requires a capacity to produce power in a very small time. Plyometric training are used to prove to shown



the develop jump performance in many games. These workouts involve strength with pace of movement to generate power. The present study was also aims to know the effect of plyometric drills which can used as a model to develop the standing straight up jump and running straight up jump of the volleyball players.

### **Methodology**

For the current study 20 players were chosen randomly from Faridabad District. The ages of the players ranged from 16 to 19 years. All the players were given the same plyometric training which was given 3 days a week and alternate in days. The external conditions of all the players were almost similar as they are practice in the same field and from the same club as they are the players of same district.

#### Experimental Design

Purposive sampling group design was adopted for the selection of the subjects. 20 subjects were randomly selected from Faridabad Volleyball Association and equated grouped design was adopted on the random basis for dividing the players/subjects in equal two groups. One group underwent the plyometric training programs which were known as the experimental group. The further group was considered as a control group where no treatment or exercises was given.

#### Administration of Plyometric Exercise Programme

After the distribution of the two groups as experimental and control group, the experimental group was subjected to a six week specific plyometric exercise program. The exercise program was given 3 days in a week (Monday, Wednesday, and Friday), the resting period between exercise series was one minute. Before the specific plyometric

exercise program the experimental group was given proper warm-up and stretching to avoid any chances of injury. The training was also concluded by proper cooling down, stretching and relaxation sessions.

#### Plyometric Exercise

Lateral Hurdle Jumps

Depth Jumps

Lunge Jump

For the first 4 weeks of the plyometric training the number of sets for the exercise remained same or unchanged. But the number of counts for the each exercises were increased from (6 to 8) to (8 to 10 times), depending upon the load consumption of the subjects or players. The intensity of the load for the last two weeks of the plyometric training (5th and 6th week) increase by increased the number of sets for each exercise by 1 and increased the repletion's of the exercises and the load of the exercises.

#### Collection of Data

The data was collected by the researcher, before and after the workout plan for both the groups experimental and control groups. Standing vertical jump and Running vertical jump test was conducted to collect data for the explosive strength of lower extremities.

#### Administration of the Test

Standing Vertical Jump

Objective: To compute the explosive power of the legs in standing vertically jumping upward.

Scoring: Maximum jumps reach minus the standing reach was the score. Three trials were given and best of the three were considered as the final score.

#### Running Vertical Jump

Running Vertical Jump:

Objective: To compute the explosive power of the legs in running jumping perpendicularly upward.



#### Equipment and Facility

A stick, pieces of colored chalk, smooth wall surface 12 to 14 feet height. The wall was marked from 6 feet onwards.

Scoring: Maximum jumps reach minus the running vertical jump reach was the score. Three trials were given and best of the three were considered as the final score.

Statistical technique: To study data on selected variables Paired 't' test was used. The level of significance to check the 't' ratio was set as 0.05 level of confidence which was considered as appropriate and adequate for the present study.

#### Analysis of Data and Discussion of Findings

The analysis of data and findings of the study are presented in the following table given below.

Standing Vertical Jump: The significance variation between the pre and post test means of experimental and control group in straight up jump and their 't' ratio are given in table-1.

TABLE 1  
COMPARISON OF MEAN OF  
EXPERIMENTAL AND CONTROL GROUP

Group	Pre Test	Post Test	MD	T-Ratio
Experimental Group	8.13	8.15	0.02	3.42
Control Group	8.16	8.17	0.01	0.024

According to the Table-1 that the ratio between the pre-test and post-test means of standing vertical jump were found significant at 0.05 level in the experimental group, where the

data were calculated and value obtained 3.42. This value was much greater than the required value 2.14 at .05 level of confidence. In case of the control group, the t-ratio between pre and post-test of standing vertical jump was found insignificant because they obtained value 0.024 after calculated the data which is less than the required value 2.14 at .05 level of significance.

Running Vertical Jump: The significance difference between the pre test and post test means of experimental and control group in running vertical jump and their 't' ratio are given in table-2.

TABLE 2  
COMPARISON OF MEAN OF  
EXPERIMENTAL AND CONTROL GROUP

Group	Pre-test	Post-test	MD	T-Ratio
Experimental Group	8.35	8.38	0.03	4.41
Control Group	8.26	8.27	0.01	0.171

According to the Table-2 that the ratio between the pre-test and post-test means of running vertical jump were found significant at 0.05 level in the experimental group, where the data were calculated and value obtained 4.41. This value was much greater than the required value 2.14 at 0.05 level of confidence. In case of the control group, the t-ratio between pre and post-test of standing vertical jump was found insignificant because they obtained value 0.024 after calculated the data which is less than the required value 2.14 at .05 level of confidence.



### Discussion of Findings

The results obtained from the statistical score show that the explosive strength of all the experimental groups for the standing verticle jump and running verticle jump have shown significant improvement after the specific plyometric training program. In case of the control group the explosive strength especially in standing verticle jump and running verticle jump was not significantly improved. This is due to simple fact that the control group was not involved in the training program. So we can conclude that whatever effect is shown in the experimental group is purely due the specific plyometric training program. During the study of the review it was found that the capacity of quick contraction and relaxation of the muscles of the body increases with various plyometric exercises. This shows that plyometric exercises improves the explosive strength of the muscles of the lower extremity. The shock absorbing ability of the joint capsule and the muscles also improves due to the plyometric exercises. It is a research proved observation that plyometric exercises helps us to burn more calories during work out. So during the specific plyometric training the students might have burn the extra caleory from the body which inturn have made the muscles to work with greater efficency resulting in the improvement of their explosive strength. The plyometric exercise improves neuro-muscular proprioception which inturn helps in the improvement of the joint's stability. To exert explosive strength ability the joint needs to be stable first. Neuro-muscular proprioception is actually an unconscious response to joint motions that occurs without awareness. This is

how an athlete response to sudden shift of body weight and stay in proper dynamic balance during a movement. This proprioceptive information includes an ability to detect joint position, movement, direction, amplitude and speed of motion. The specific plyometric training program have surely improve the neuro-muscular control and the proprioceptive feedback system which inturn have shown a better performance in explosive strength ability of the body. There might be many other reasons which might have cause improvement in the explosive strength of the lower extremity in the experimental group.

### References

- Bishop, Daniel C; Smith, Russell J; Smith, Mark F; Rigby, Hannah E. (2009). "Effects of Plyometric Training on Swimming Block Start Performance in Adolescents". *Journal of Strength and Conditioning Research*: October 2009- Volume 23- Issue 7- pp 2137-2143.  
(Doi: 10.1519/JSC.0b013e3181b866d0).
- Black, B. (1995). "Conditioning for Volleyball", *Strength and Conditioning Journal*, 17(5), 53–55.
- Bompa Tudor O., (1999). "Periodization: Theory and Methodology of Training" (4<sup>th</sup>edn.) Champaign, Illinois: Human Kinetics publishers, p.210.
- Kraemar, W, J and Newton, R.U. (1994). "Training for Improved Vertical Jump". *Journal of Sports Sciences Exchange*, 7(6) 1-12.
- Markovic G et.al (2007). "Effects of Sprint and Plyometric on Muscles Function and Athletic Performance". *Journal of Strength and Conditioning Research*, May: 21 (2) 543-9.
- Markovic G, Mikulic P. (2007). "Neuro-Musculoskeletal and Performance Adaptation to Lower-Extremity Training", (PMID: 20836586 Pubs Med).