

## **Effect of Plyometrics Training on Explosive Strength and Speed Performance of Long Jumpers**

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### **Abstract**

The purpose of this study was to assess the effect of plyometric training on explosive strength & speed performance of long jumpers. Various studies suggest that plyometric training improves explosive strength and speed performance. However, the effectiveness of plyometric training depends upon several factors. Integrating plyometric training program aims to provide a comprehensive approach to performance enhancement. Based on their training, Seven male jumpers were divided into 2 groups: a plyometric training group (n=7), a weight training group and a control group (n=7). The program was designed to implement in starting phase of competitive season, where aim to maintaining peak performance and minimizing risk of injuries. The objectives of the study were to determine the effect of plyometric training on explosive strength and speed performance of Long Jumpers. Subjects in each of the training group trained five days per week, whereas control subjects did as usual/traditional training. The data was analyzed by a paired sample t-test. The results showed that all the training treatment of Strength test found elicited significant difference in mean compression while ( $P < 0.05$ ) and the compression of mean in speed test was also found significant difference and ( $P < 0.05$ ) respectively. The findings of this study reveal a significant improvement on both speed and strength performance. The researchers proved that the addition of plyometric training in a routine/traditional training program was more effective in improving of sprint and explosive strength performance. Researchers strongly recommend that athletics coaches implement plyometric training in training schedule to enhance the performance of their athletes.

**Keywords:** Plyometric Training, Explosive Strength, Speed, Long Jumpers

### **Introduction:**

In athletics long jump is a highly skilled field event which demanding from every competitor to maintain athletic physique in shape of explosive power, speed, and jumping technique. Long jump demands acceleration, accurate technique, takeoff velocity, cycling and landing to cover maximum pit distance. Explosive power is very vital for generating force to achieving maximum distance in performing jumping activity and timing in sprint races.

In a study conducted by Matavulj et al. (2001), they endorsed that 2-3 weeks plyometric exercises improved the jumping ability of 15-17 years of basketball players and they able to increase the

height of their vertical jumps by an impressive 12-15%. The result of meta-analysis (de Villarreal et al., 2012) stated by PT seems to be an effective training method for the improvement of the sprint performance. This research study would appear to support the idea for young athletes by which can benefit from plyometric training. According to literature, strength training enhances output of muscles force. However, the literature stated the positive effect of the strength endurance training on increasing anaerobic performances (Murlasits, Z., Kneffel, Z., & Thalib, L. 2018). Integrating plyometric training program aims to provide a comprehensive approach to performance enhancement. The program is designed to be implemented during the competitive season, where maintaining peak performance and minimizing injury risk are paramount. The combination of heavy strength training and plyometric is intended to produce synergistic effects, enhancing both the maximal strength and the explosive power of the athletes. This approach is particularly relevant for jumpers and sprinters, who require a balance of strength and explosiveness to excel in their sport. By systematically incorporating these training methods into an in-season regimen, the study aims to determine their effectiveness in improving athletics performance, such as explosive strength and sprinting speed, while also ensuring the athletes remain in peak physical condition throughout the season. The characteristics of plyometric training make it very effective for improving not just muscle strength but more importantly to build also capacity of tendons, muscles and the physiological system to generate explosive forces. The way in which explosive strength is generated can be adequately explained using both mechanical and neurophysiological models.

With reference to (Markovic, Jukic, Milanovic, & Metikos, 2007), it is stated that plyometric training is effective training and it is suggested to add a plyometric program to the usual training for 8 weeks without making the athletes train longer also the researchers thought that this might be helpful to improve their explosive movements. Explosive power is the ability to use a lot of muscle strength very quickly often used in anaerobic activities (Wang, X., et al., 2023). Explosive strength is very important for every athlete to succeed in competitions. In light is literature, coaches and researchers are interested to train their which includes explosive training through plyometric program (Peitz, M., Behringer, M., & Granacher, U. 2018). So, it's tough to get better at both strength and speed (which is called explosive power). The related studies stated that both PLT and CT can really help the athlete physique to enhance explosive power (Wang, X., et al., 2023).

### **Identify Gap**

Substantial research exists on the benefits of heavy strength training and plyometric training, there is a significant gap in understanding the phases of jump which allow athletes to focus on building strength and power for takeoff, cycling and landing without the immediate pressure of competition, enabling more intensive and varied workouts. However, the dynamics change considerably during the competitive season, where the primary focus shifts to maintaining performance and minimizing fatigue and injury.

### **Objective of the Study**

- To determine the effect of plyometric training on explosive strength of Long Jumpers.
- To access the effect of plyometric training on speed of Long Jumpers

### **Hypothesis of the study**

- There is no significant difference of plyometric training on explosive strength of Long Jumpers
- There is no significant difference of plyometric training on speed performance of Long Jumpers

### **Materials & Methods**

The researcher used pre and post experimental design to test the study hypothesis to rigorously

assess the 10 weeks effect of plyometric training on explosive strength and speed of long jumpers. The design approach clear understanding of pre and post effectiveness of plyometric training on jumpers.

### Participants

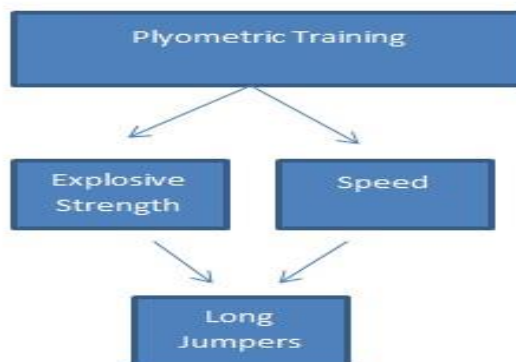
Fourteen district level long jumpers voluntarily participate in this study. The participants were randomly assigned into two groups first an experimental group (n = 07), which underwent a plyometric training and another one were control group (n = 07), which underwent as usual/traditional training. The study was conducted from July to September 2024, at the starting phase of the competitive season.

### Research Instrument/ Protocol:

The researchers conduct the present study in order to evaluate effects of plyometric exercise protocol upon explosive strength and speed District level Jumpers. Being a certified coach the researcher prepared self-made 10 weeks training protocol to collect relevant data of the selected variable. The researchers was used validated standing long jump test for strength performance and 60m test for measurement of pre and post timings of speed performance.

### Study procedures:

The procedure of the study was performed under supervision of researcher/certified coach on outdoor athletic track with a tartan surface at Sports Complex, Bannu. Pre and Post-test were made at the same track under the same experimental condition.



### Statistical analyses:

In the analysis section the table's shows descriptive statistics including mean, standard deviation and significant difference were used for calculation and measurement. Inferential statistics, such as paired samples t-test was used to compare pre-test and post-test scores between the experimental and control groups.

The set of below tables present the descriptive statistics in both control and experimental group. In pre intervention control group has the highest mean value (8.2657) with standard deviation of .30838 and the Control Group (7.7757) with standard deviation of .14129 respectively. The intervention showed that plyometric training had a significant effect of speed performance of long jumpers.

**Paired Samples Statistics**

HT Speed	Mean	N	Std. Deviation	Std. Error Mean
Control	8.2657	7	.30838	.11655
Experimental	7.7757	7	.14129	.05340

**Paired Samples Test**

HT Speed	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Control - Experimental	.49000	.20008	.07562	.30495	.67505	6.479	6	.001

The below tables show descriptive statistics of strength between control and experimental group. In pre intervention control group has the highest mean value (18.8443) with standard deviation of .2298 and the Control Group (2.1057) with standard deviation of .03760 respectively. The intervention showed that plyometric training had a significant effect of strength performance of long jumpers.

**Paired Samples Statistics**

HT Strength	Mean	N	Std. Deviation	Std. Error Mean
Control	1.8443	7	.06079	.02298
Experimental	2.1057	7	.09947	.03760

**Paired Samples Test**

HT Strength	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Control - Experimental	.78714	.27164	.10267	.53591	1.03837	7.667	6	.000

**Conclusion and Discussion:**

All the participants of this experimental study completed training program, and none of them reported any training-related injury. The findings of this study reveal a significant improvement on both speed and strength performance. This supports with recent research concluded that when plyometric exercise intensity is high during the session, there is a greater improvement in sprint performance (Sáez de Villarreal, et al., 2012). Another finding of the study stated that plyometric training support explosive strength performance of long jumpers and also the finding supported by another findings which indicates that plyometric training improves strength, power output, coordination, and athletic performance (Sporiš, G., Milanović, L, et al., 2010). In light of above the researchers proved that the addition of plyometric training in a routine/traditional training program was more effective in improving of sprint and explosive strength performance. Researchers strongly recommend that athletics coaches implement plyometric training to enhance the performance of their athletes. In addition the researchers will also encourage further investigation of the scientific mechanisms for contributing in athletics performance.

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