



## Impact of plyometric training on explosive strength outputs among collegiate boys

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### Abstract

The aim of this study was to determine the precise effect of plyometric training on explosive strength of healthy individuals. The present investigation intended to determine the impact of, plyometric training on strength outputs in young boys. 30 physically active students, aged between 17-21 years. The selected subjects were randomly divided into two equal groups of fifteen subjects each (n=15). The groups were experimental group (EG) and control group (CG). During the training period, the experimental group underwent their respective training programme 3 days per week for eight weeks apart from their regular activities. Control group (CG) was not participating in any specific training.

**Keywords:** explosive power, leg strength, plyometric training

### 1. Introduction

The adaptation of the human body to physical exercise through various sports activities can improve the health of internal systems and the efficiency of external movements. A plyometric contraction involves first a rapid muscle lengthening movement (eccentric phase), followed by a short resting phase (amortization phase), then an explosive muscle shortening movement (concentric phase), which enables the muscles to work together in doing the particular motion. It is used to increase the speed or force of muscular contractions, providing explosiveness for a variety of sport specific activities. This training involves and uses, practicing plyometric movements to toughen tissues and train nerve cells to stimulate a specific pattern of muscle contraction, so the muscles generate as strong a contraction as possible in the shortest amount of time (Chu, 1998, Goran, 2007) <sup>[4, 10]</sup>. Plyometric exercises with additional weights have been used successfully by many athletes as a method of training to enhance power (Andrew, 2010) <sup>[5]</sup>.

Strength is one of the most important components of physical fitness, which affects performance in almost all games and sports in some form or the other. Elastic strength is an ability to exert force quickly and to overcome resistance with a high speed of muscle action. High level elastic strength requires good coordination and a combination of high speed and strength of muscle action (Asmussen, 1974) <sup>[1]</sup>. Plyometric exercises with weights are the best method to improve elastic strength (Blackey, 1987) <sup>[2]</sup>. High level explosive strength requires good coordination and a combination of high speed and strength of muscle action (Dodd, 2007) <sup>[6]</sup>. In this action the neuromuscular system to overcome resistance with high speed of contraction when the skeletal lever system accepts

and expels at high velocity *viz*; a coordination of motor units, reflexes, elastic component and contractile component of the muscle. Plyometric training helps to develop the contractile protein that gives the muscle in pulling power (Edwin *et al.* 2000) <sup>[11]</sup>.

### 2. Methodology

The aim of this study was to find out the effects of plyometric training on explosive strength among young boys. Thirty male young students (n=30) studying under graduation in the Department of Physical Education, Punjabi University Patiala, were selected as subjects and the age of students were between 17 and 21 years. The selected subjects were randomly divided into two equal groups of fifteen subjects each (n=15). The groups were experimental group (EG) and control group (CG). During the training period, the experimental group underwent their respective training programme 3 days per week for eight weeks apart from their regular activities. Control group (CG) was not participating in any specific training. Moderate intensity (60-70%) was used in this experimentation. Explosive strength was selected as dependent variable for this study. It was measured by using five bunny hops test. These plyometric exercises were used to perform this study for strengthening the lower body 1. drop jump; 2. tuck jump; 3. split jump; 4. bounding; 5. single leg hop; 6. hurdling exercises; 7. Medicine-ball exercises. The pre and post tests were conducted one day before and after the experimental treatment. Mean and standard deviation were calculated for elastic strength for each group. The data were analyzed by using analysis of covariance (ANCOVA). Statistical significance was fixed at 0.05 levels.

### 3. Analysis of Data

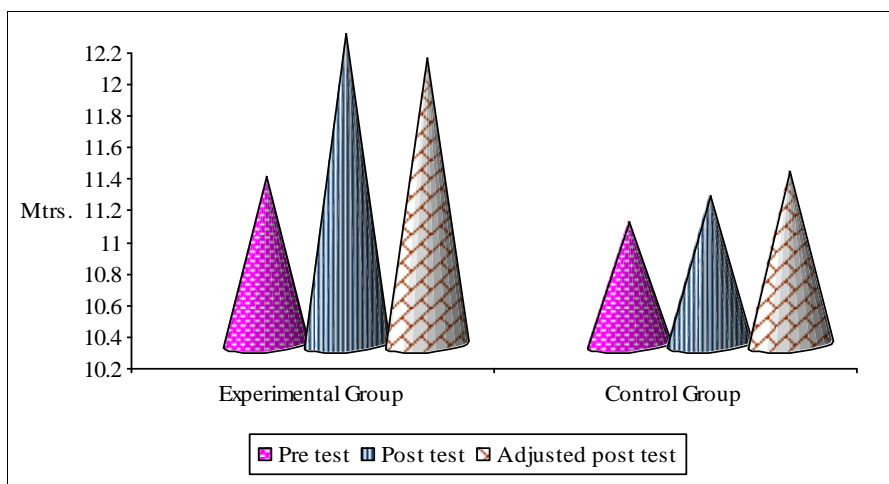
**Table 1:** Analysis of covariance for elastic strength of experimental group and control group

| Test               |      | Experimental Group | Control Group | SOV | SS    | df | MS   | F ratio |
|--------------------|------|--------------------|---------------|-----|-------|----|------|---------|
| Pretest            | Mean | 11.27              | 10.98         | B   | 0.65  | 1  | 0.65 | 1.17    |
|                    | SD   | 0.76               | 0.73          | W   | 15.61 | 28 | 0.56 |         |
| Post test          | Mean | 12.17              | 11.14         | B   | 7.90  | 1  | 7.90 | 10.49*  |
|                    | SD   | 0.92               | 0.82          | W   | 21.08 | 28 | 0.75 |         |
| Adjusted Post test | Mean | 12.02              | 11.30         | B   | 3.77  | 1  | 3.77 | 21.67*  |
|                    |      |                    |               | W   | 4.69  | 27 | 0.17 |         |

\*Significant  $F = (df 1, 28) (0.05) = 4.20$  &  $(df 1, 27) (0.05) = 4.21$ ;  $(p \leq 0.05)$ .

The analysis of covariance on explosive strength of the pre, post and adjusted post mean scores of experimental group and control groups have been analysed and presented in Table 1. The above table indicates that the pre test mean on explosive strength was 1.17, which was lesser than the table value of 4.20 at 0.05 level of confidence; hence there was no significant difference in pre test data of experimental and

control groups. The analysis of post and adjusted post test mean data reveals that ‘F’ value of 10.49 and 21.67 respectively, which was higher than the table ‘F’, hence there exist difference in explosive strength among the experimental and control groups. The pre, post and adjusted post mean values of experimental group and control group on elastic strength were graphically represented in the Figure 1.



**Fig 1:** The pre, post and adjusted post test mean values of experimental group and control group on elastic strength

### 4. Findings and Conclusion

This study shows that the plyometric training is capable of improving explosive strength among under graduate students. Several studies suggested that plyometric training is very valuable for determining the variables such as explosive strength (Campo *et al.*, 2009 & Andrew *et al.*, 2010) [3, 5]. The development explosive strength as result is supported by the findings of Faigenbaum (2007) [7] and George (2010) [8]. Finally Roger (2007) [9] reported increase in explosive strength performance after 12 weeks plyometric training. Our findings provide further support to the notion that plyometric training can demonstrate benefits in a short period of time, indicating that twenty four sessions of plyometric training suffice for improving explosive strength. Plyometric training has been shown to increase factors associated with explosiveness. This study shows that the explosive strength was significant difference occurred between the plyometric training group and the control group. It is concluded that the plyometric training performed best for explosive strength as compared to control group.

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