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[ijirset@gmail.com](mailto:ijirset@gmail.com)

[www.ijirset.com](http://www.ijirset.com)

# Effect of Plyometric Training on Explosive Strength

Dr. Rejaul Islam

Assistant Professor, Acharya Sukumar Sen Mahavidyalaya, PO-Gotan, Purba Bardhaman, WB, India

**ABSTRACT:** Physical fitness is a general state of health and well-being and, more specifically, the ability to perform aspects of sports, occupations and daily activities. Physical fitness is generally achieved through proper nutrition, moderate-vigorous Physical exercise, physical activity, and sufficient rest. Plyometrics also known as "jump training" or "plyos", are exercises in which muscles exert maximum force in short intervals of time, with the goal of increasing power (speed-strength). This training focuses on learning to move from a muscle extension to a contraction in a rapid or "explosive" manner, such as in specialized repeated jumping. Plyometrics are primarily used by athletes, especially martial artists, sprinters and high jumpers, to improve performance, and are used in the fitness field to a much lesser degree. For the purpose of the study sixty football players were selected and Plyometric training was practiced for six weeks. And the mean differences between control and experimental group in pre-test of Standing Broad Jump the t-value was computed the value was found to be 0.90, which was not significant at 0.05 level and to observed the mean differences between control and experimental group in post-test of Explosive Strength, the t-value was computed the value was found to be 2.77, which was significant at 0.05 level.

From the table it was showed that a significant difference was observed between Experimental and Control group in Post-test and also another difference was found between pre-test and post-test of Experimental groups, whereas no others difference was found in pre-test and post-test of control group.

## I. INTRODUCTION

Playing of football, the players required a high level of physical fitness. Physical fitness is a general state of health and well-being and, more specifically, the ability to perform aspects of sports, occupations and daily activities. Physical fitness is generally achieved through proper nutrition, moderate-vigorous Physical exercise, physical activity, and sufficient rest.

Many different motor fitness test batteries had been published and reported in the measurement texts. Most of these test batteries have developed in USA. The AAHPER youth fitness test battery was the first youth fitness test battery, which was extensively used in the school and research work the original AAHPER youth fitness test battery was published in 1958 and successively revised in 1975 and 1976. This was developed by a group of Physical Educator who selected these tests based on logic. The youth fitness test battery was not developed through test validation research. In 1975, major changes were made. The strength-leg sit-up was replaced by bent-leg sit-up from the Texas test (1973) and the soft ball throw was dropped. It was thought that the strength-leg, sit-up and the throw for distance caused muscular skeletal injuries. In addition, the longer distance run of Texas test (1973) was offered as options.

Plyometrics also known as "jump training" or "plyos", are exercises in which muscles exert maximum force in short intervals of time, with the goal of increasing power (speed-strength). This training focuses on learning to move from a muscle extension to a contraction in a rapid or "explosive" manner, such as in specialized repeated jumping. Plyometrics are primarily used by athletes, especially martial artists, sprinters and high jumpers, to improve performance, and are used in the fitness field to a much lesser degree.

Plyometrics includes explosive powerful training exercises that are trained to activate the quick response and elastic properties of the major muscles in the body. It was Initially made famous by Soviet Olympians in the 1970s, providing the core element in the strength programs of elite sporting athletes worldwide. Sports using plyometrics include basketball, tennis and volleyball as well as the various codes of football.

The term "plyometrics" was coined by Fred Wilt after watching Soviet athletes prepare for their events in track and field and also observed that this was a key to their success. He began a collaboration with trainer Michael Yessis of Soviet (Russia) to promote plyometrics.



Since its introduction in the early 1980s, two forms of plyometrics have evolved. In the original version of plyometrics, created by Russian scientist Yuri Verkhoshansky, it was defined as the shock method. In this, the athlete would drop down from a height and experience a "shock" upon landing. This in turn would bring about a forced eccentric contraction which was then immediately switched to a concentric contraction as the athlete jumped upward. The landing and takeoff are executed in an extremely short period of time, in the range of 0.1–0.2 second. The shock method is the most effective method used by athletes to improve their speed, quickness, and power after development of a strong strength base.

1.2 Statements Of The Problem: Effect of Plyometric training on explosive strength

1.2 Purpose Of The Study: The investigators were trying to find the effect of plyometric training on explosive strength

## II. METHODOLOGY AND MATERIALS

### 2.1 Plyometric Exercises

- Squat jump: squat down then jump off the ground as high as possible.
- Lateral jumps: from a standing position, jump side to side.
- Power skipping: on each skip, lift the upper leg as high as possible.
- Tuck jumps: with feet shoulder width apart, jump, tuck the legs in, extend them, and land.
- Alternate leg bounding: run with long strides, placing emphasis on hang time.
- Box Jumps: jump onto and off of a large box 18" or higher.
- Vertical depth jump: starting from the top of a box, jump down and back up as fast as possible.
- Plyometric push-up: perform a push up, but exert enough upward force to lift the hands and body off the ground.
- Split: the split, on the contrary of what people might think, also helps the plyometrics.
- Scoop hopping: common martial arts exercise - swing arms in full circle during jump before touching toes in mid-air.

2.2 Choice of Subjects: For the purpose of the study sixty football players were selected.

### 2.3 Choice of Investigating Materials

To conduct the study, the following criteria were measured-

- I. Standing height of the subject record (in centimeters) scale.
- II. Weight of the subject record (in kilogram) with a weighing machine.
- III. Age of the subject were record in complete years as per their Madhyamik admit card.
- IV. The leg explosive strength was measured by standing broad jump.

### 2.4 Instruments and Tools used for training:

- Hurdle : - 12" – 36"
- Wooden Box 30 – 80 cm
- Measuring Tape 50 meters.
- Plastic Pointer
- Football
- Goal Post
- Wooden stick
- Lime dust
- Wooden stick
- Lime dust
- Whistle
- Stop watch
- Cones
- Stop watch
- Cones



III. RESULT AND DISCUSSION

3.1 Training Effects on Leg Explosive Strength

The Mean and SD values of Explosive strength of Control and Experimental groups in pre-test and post-test were shown in table-.

TABLE-1

Mean and SD values of Control and Experimental groups in pre-test and post-test of Leg Explosive Strength

VARIABLES	CONTROL GROUP		EXPERIMENTAL GROUP	
	PRE-TEST	POST-TEST	PRE-TEST	POST-TEST
MEAN	60.92	61.16	60.56	65.48
SD(±)	5.80	5.64	6.42	5.69

From table-1 it appears that the Mean values of Control group in pre-test and post-test of Leg Explosive Strength were 60.92 and 61.16 and the SD values were ±5.80 and ±5.64 respectively.

The mean and Standard Deviation values of explosive strength of Experiment Group in pre test and post test were 60.56 and 65.48 and the SD values were ±6.42 and± 5.69 respectively.

The Mean and SD values of Explosive Strength of control and experimental group in pre-test and post-test were presented graphically in figure-1

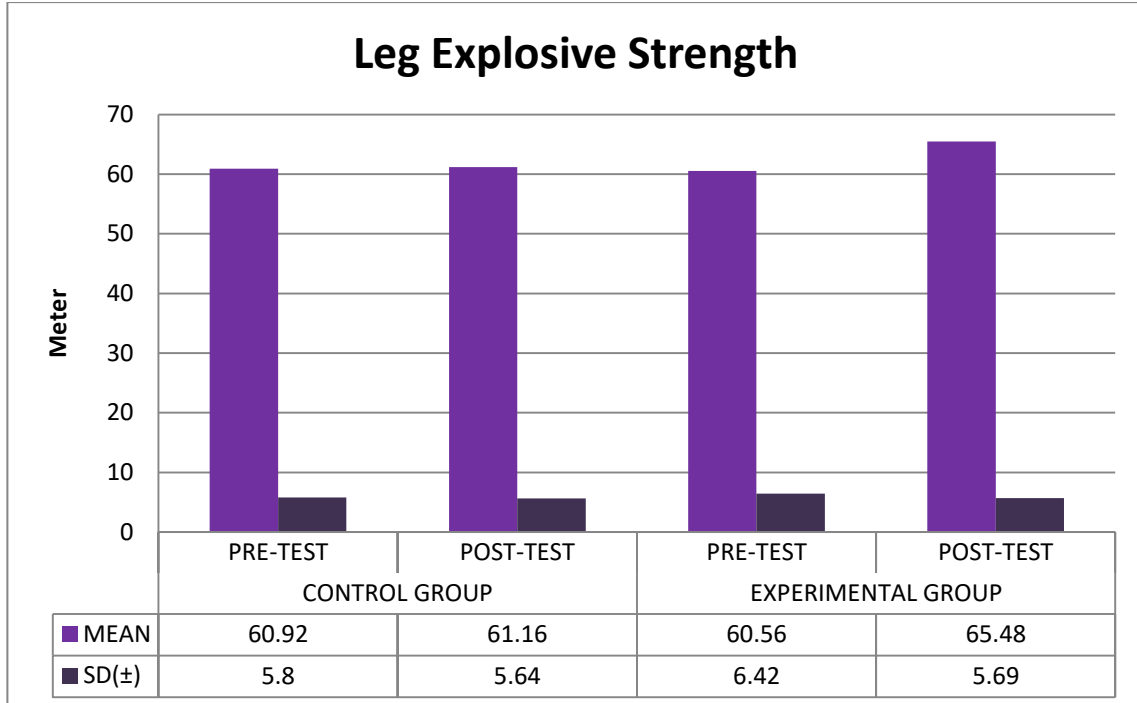


Figure-1: Mean and SD Control and Experimental group in pre-test and post-test of Leg Explosive Strength.

Comparing the Mean values of explosive strength in pre test and post test of experimental group and control group differences were observed. To observe the significant differences among the groups the ANCOVA was computed and the F-value was shown in table-2.



**TABLE-2**  
ANCOVA values of Control and Experimental group in Pre-test and Post-test of Leg Explosive Strength

	Sum of Squares	Df	Mean Square	F-value	Sig. level
<b>Contrast</b>	502.766	1	502.766	42.498	0.05
<b>Error</b>	556.025	47	11.830		

From the ANCOVA table it evoked that a significant difference was observed among the groups and the value was found to be 42.498, which was significant at 0.05 levels and to compare the mean differences between the groups the t-values was computed and values were shown in table-3.

**TABLE-3**  
Mean differences of Control and Experimental group in pre-test and post-test of Standing Broad Jump

PRE-TEST	VARIABLES	CONTROL GROUP	EXPERIMENTAL GROUP	“t” VALUE
	<b>MEAN</b>	60.92	60.56	0.90
	<b>S.D (±)</b>	5.80	6.42	
<b>POST-TEST</b>	<b>MEAN</b>	61.16	65.48	2.77*
	<b>S.D (±)</b>	5.64	5.69	
	<b>“t” VALUE</b>	0.44	2.96*	

\* level of significant at .05 level. df= 48

In table-3 it appears that the mean differences between the groups in pre-test and post-test of Control and Experimental groups of Standing Broad Jump were computed. To observe the mean differences between pre-test and post-test of control group in Explosive Strength, the t-value was computed the value was found to be 0.44, which was not significant at 0.05 level and to observed the mean differences between pre-test and post-test of experimental group in Explosive Strength, the t-value was computed the value was found to be 2.96, which was significant at 0.05 level.

Likely, to observed the mean differences between control and experimental group in pre-test of Standing Broad Jump the t-value was computed the value was found to be 0.90, which was not significant at 0.05 level and to observed the mean differences between control and experimental group in post-test of Explosive Strength, the t-value was computed the value was found to be 2.77, which was significant at 0.05 level.

From the table it was showed that a significant difference was observed between Experimental and Control group in Post-test and also another difference was found between pre-test and post-test of Experimental groups, whereas no others difference was found in pre-test and post-test of control group.

**David Leslie Fabricius (2011)** studies on Comparison of aquatic- and land-based plyometric training on power, speed and agility in adolescent rugby union players and he found that the Aquatic-based plyometric training could provide similar and even better performance in vertical jump and agility than land-based plyometric training.



**Alberto Carvalho and others (2014)** studied on Effects of Strength Training Combined with Specific Plyometric exercises on body composition, vertical jump height and lower limb strength development in elite male handball players:

**Ying-Chun Wang and Na Zhang (Aug- 2016)** studied on Effects of plyometric training on soccer players. Plyometric training (PT) is a technique used to increase strength and explosiveness.

In the present study, researcher observe the mean difference on explosive strength and found significant difference between pre test and post test on experimental group and also observed significant difference between control group and experimental group on post test. The previous researcher also observed significant difference between pre and post test on explosive strength due to plyometric training effect.

#### IV. CONCLUSION

From the present research it can be concluded that plyometric training has significant effect on explosive strength.

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