



## **The effect of high intensity plyometric training with and without mental training on selected physiological variable (Breath Holding Time) among long jumpers**

**Dr. GP Raju**

Assistant Professor, Department of Physical Education, JNTUK University College of Engineering, Narasaraopet, Andhra Pradesh, India

### **Abstract**

The purpose of the study was to find out the effect of high intensity plyometric training with and without mental training on selected physiological variable, breathe holding time, among long jumpers". To facilitate the study, 60 male students from the different college level of Andhra Pradesh, who had represented their college level in intercollegiate competitions, were selected. The selected subjects were in the age ranged between 19-25 years. They were further divided into three groups namely, High intensity Plyometric training with mental training (HPMTG), high intensity plyometric training without mental training (HPTG) and control group (CG), on random basis. Each group consists of 20 subjects. The pre and test scores were analysed by using ANCOVA statistical technique.

**Keywords:** high intensity plyometric training, mental training

### **Introduction**

Sport plays a very prominent role in the modern society. It is important to individuals, a group, a nation and indeed the world. Throughout the world, sport has a popular appeal among people of all ages and both sexes. Much of the attraction of sport comes from the wide variety of experience and feeling that result from participation such as success, failure, exhaustion pain, relief and feeling of belonging. Sport can bring money, glory, status and goodwill. However, sport can also bring tragedy, grief and even death (Coakley, Jay J., 1998) [5].

### **Long Jump**

The long jump (historically called the broad jump) is a track and field event in which athletes combine speed, strength, and agility in an attempt to leap as far as possible from a take-off point. This event has a history in the Ancient Olympic Games and has been a modern Olympic event for men since the first Olympics in 1896 and for women since 1948.

### **Training**

Training is not a recent discovery. In ancient times, people systematically trained for military and Olympic endeavors. Today athletes prepare themselves for a goal through training. Training represents a longterm endeavour. Athletes are not developed overnight and a coach cannot create miracles by cutting corners through overlooking scientific and methodical theories.

### **Muscle Mechanism of Plyometric Training**

Plyometric exercises are the rapid deceleration and acceleration of muscles that create a stretch shortening cycle. The exercises train the muscles, connective tissue and nervous

system to effectively carry out the stretch – shortening cycle, thereby improving an athlete's performance. The maximum force that a muscle can develop is attained during a rapid eccentric contraction. However, it should be realized that muscle seldom perform one type of contraction in isolation during athletic movements. When a concentric contraction occurs (muscle shorten) immediately following on eccentric contraction (muscle lengthens) than the force generated can be dramatically increased. If a muscle is stretched, much of the energy required to strictly is lost as heat, but some of this energy can be stored by the elastic components of the muscle only during a subsequent contraction. It is important to realize that this energy boost is lost if the eccentric contraction is not followed immediately by a concentric effort. To express this greater force the muscle must contract within the shortest possible of time. This whole process is the underlying mechanism of plyometric training (Will and Freeman, 1980). Consumption duration between 3 minutes to 6 minutes meets this requirement.

### **Mental Training**

An athlete's state of mind can significantly affect his or her performance or the eventual outcome of competition. Developing strong mental skills can help athletes of all levels competitions. The pressure and desire to win, managing a unique and busy schedule, past success or failure in competition, injuries and rehabilitation, expectations of coaches, parents, or sponsors are some of the influences affecting an athlete's state of mind include.

### **Need of the Study**

The plyometric training is to produce greater power by training the muscles to contract more quickly and forcefully

from an actively pre-stretched position. The effectiveness of the exercise relies upon the conditioning of the plyometric, or stretch-reflex, mechanism and the natural elastic properties of the muscle. A concentric contraction is much stronger when it is preceded by an eccentric contraction. In an eccentric contraction, the muscle reacts very powerfully against the rapid stretching. This reaction is the stretch-reflex. A fundamental principle of plyometric training is that the muscle needs to be pre-stretched quickly. The rate of stretch of the muscle is much more important than the degree of stretch.

### Objectives of the study

1. To formulate suitable mental training that would help to improve selected physiological levels of long jumpers.
2. To experiment with selected high intensity plyometric training with mental training and high intensity plyometric training without mental training on selected physiological variables among long jumpers.
3. To determine whether high intensity plyometric training with mental training or high intensity plyometric training without mental training could contribute better on selected physiological variables of long jumpers compared with control group.

### Statement of the Problem

The purpose of this study was to find out “The effect of high intensity plyometric training with and without mental training on selected physiological variable, breath holding time, among long jumpers.”

### Methodology

In this Paper, the selection of subjects, selection of variables, orientation of subjects, reliability of instruments, competency of tester, reliability of data, test administration, experimental design and the statistical procedure used have been explained.

### Selection of Subjects

The purpose of the study was to find out the effect of high intensity plyometric training with and without mental training on selected physiological variables, breathe holding time, among long jumpers”. To facilitate the study, 60 male students from the different college level of Andhra Pradesh, who had represented their college level in intercollegiate competitions, were selected. The selected subjects were in the age ranged between 19-25 years. They were further divided into three groups namely, High intensity Plyometric training with mental training (HPMTG), high intensity plyometric training without mental training (HPTG) and control group (CG), on random basis. Each group consists of 20 subjects.

Before the commencement of the training, purpose of the study and method of performing high intensity Plyometric training and mental training exercises were explained to the subjects for their cooperation and to avoid injuries.

### Selection of Variables

The researcher reviewed the various scientific literatures pertaining to varied intensities of Plyometric training and mental training on selected physiological variable from books, journals, and research papers. Taking into consideration the feasibility and availability of instruments the following variable was selected.

### Dependent Variable

**Physiological Variable:** Breath Holding Time

### Independent variables

1. High Intensity Plyometric Training with Mental Training (HPMG) for 12 weeks.
2. High intensity Plyometric Training without Mental Training (HPTG) for 12 weeks.

### Experiment Design

The study was formulated as a true random group design consisting of a pre-test and post-test. The subjects (N=60) were randomly assigned to three equal groups of twenty male students. The groups were designed as experimental group I high intensity plyometric training with mental training group (HPMG), experimental group II high intensity plyometric training without mental training group (HPTG) and control group (CG) respectively. Each group consists of 20 college level long jumpers. Pre-test was conducted for all the 60 subjects on selected physiological variable such as, breath holding time. The experimental groups (high intensity plyometric training with mental training and without mental training) participated in respective training for a period of twelve weeks. The control group did not participated in any of the training programmer. The post-test was conducted on the above said dependent variables after the experimental period for all the three groups. The difference between initial and final mean scores of the groups was the effect of respective experimental treatment on the subjects. The differences in the mean scores were subjected to statistical treatment using ANCOVA. In all cases 0.05 level was fixed test the hypothesis of the study.

### Breath Holding Time

**Objective:** The purpose of this test was to measure the breath holding time.

**Equipment's:** For recording the breath holding time, a stop watch (1/10<sup>th</sup> of second) and nose clip were used.

### Administration

The subject was instructed to stand at ease and to inhale deeply after which he holds his breath for a length of time possible by him. A nose clip was placed on nose to avoid letting the air through nostrils. The duration from the time of holding his breath until the movement he let air out was clocked by using the stop watch to the nearest one tenth of a second as breath holding time. The co-operation of the subject to let out the air by opening the mouth was sought to block the exact breath holding time.

**Scoring:** The time is recorded in seconds and the beset of two trials were recorded (Mathew, 1988).

### Statistical Procedure

The following statistical procedures were followed to estimate the effect of high intensity of plyometric training with mental training and without mental training on selected bio-motor and physiological variables among college level long jumpers.

The pre and test scores were analysed by using ANCOVA statistical technique. When the F-ratio was found to be significant, Scheffe's post-hoc-test was to find out the paired mean significant difference (Thirumalaisamy, 1998).

**Results and Discussions**

**Results on Breath Holding Time**

The statistical analysis comparing the initial and final means of Breath holding time due to High intensity plyometric

training with mental training and High intensity plyometric training without mental training among long jumpers is presented in Table I.

**Table 1:** Computation of analysis of Covariance of Breath Holding time

	HPMT Group	HPT Group	Control Group	Source of Variance	Sum Of Squares	Df	Mean Squares	Obtai-ned F
Pre-test Mean	40.65	39.00	40.35	Between	30.90	2	15.45	0.56
				Within	1563.10	57	27.42	
Post-test Mean	44.35	42.05	39.40	Between	245.43	2	122.72	5.25*
				Within	1332.30	57	23.37	
Adjusted Post-test Mean	43.79	42.91	39.10	Between	248.57	2	124.28	38.51*
				Within	180.73	56	3.23	
Mean Diff.	3.70	3.05	-0.95					

HPMT: High intensity Plyometric with Mental Training

HPT: High intensity Plyometric without mental training

Table F-ratio at 0.05 level of confidence for 2 and 57 (df) =3.16, 2 and 56 (df) =3.16.

\*Significant at 0.05 level.

As shown in Table-I, the obtained pre-test means on Breath holding time on High intensity plyometric training with mental training group was 40.65, High intensity plyometric training without mental training group was 39.00 and control group was 40.35. The obtained pre-test F-value was 0.56 and the required table F-value was 3.16, which proved that there was no significant difference among initial scores of the subjects.

The obtained post-test means on Breath holding time on High intensity plyometric training with mental training group was 44.35, High intensity plyometric training without mental training group was 42.05 and control group was 39.40. The obtained post-test F-value was 5.25 and the required table F-value was 3.16, which proved that there was no significant difference among post-test scores of the subjects.

Taking into consideration of the pre-test means and post-test means adjusted post-test means were determined and analysis of covariance was done and the obtained F-value was greater than the required value of 3.16 and hence it was accepted that there was significant differences among the treated groups.

Since significant differences were recorded, the results were subjected to post-hoc analysis using Scheffe’s Confidence Interval test. The results were presented in Table-II.

**Table 2:** Scheffe’s Confidence Interval Test Scores on Breath holding time

MEANS				Required C.I.
HPMT Group	HPT Group	Control Group	Mean Difference	
43.79	42.91		0.88	1.43
43.79		39.10	4.69*	1.43
	42.91	39.10	3.81*	1.43

HPMT: High intensity Plyometric with Mental Training

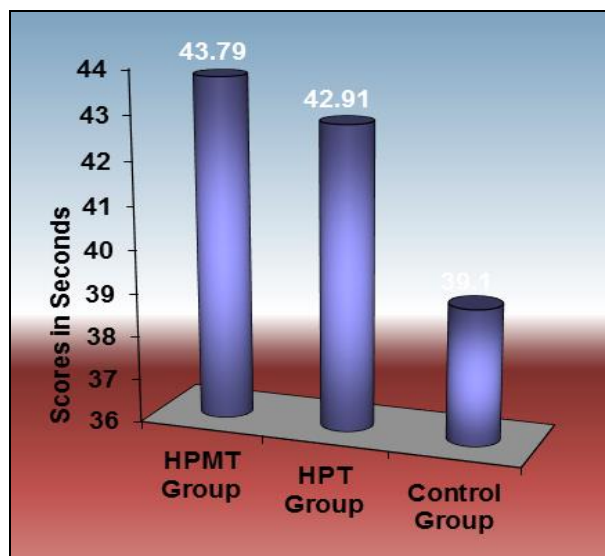
HPT: High intensity Plyometric without mental training

\* Significant at 0.05 level

The post-hoc analysis of obtained ordered adjusted means proved that there was significant differences existed between High intensity plyometric training with mental training group and control group (MD: 4.69). There was significant difference between High intensity plyometric training without mental training group and control group (MD: 3.81). There

was no significant difference between treatment groups, namely, High intensity plyometric training with mental training group and High intensity plyometric training without mental training group (MD: 0.88).

The ordered adjusted means were presented through bar diagram for better understanding of the results of this study in Figure I.



**Fig 1:** Bar diagram on ordered adjusted means on breath holding time

**HPMT:** High Intensity Plyometrics with Mental Training  
**HPT:** High Intensity Plyometrics without mental Training

**Discussions on Findings on Breath Holding Time**

The effect of High intensity plyometric training with mental training and High intensity plyometric training without mental training on Breath holding time is presented in Table-I. The analysis of covariance proved that there was significant difference between the experimental group and control group as the obtained F-value 38.51 was greater than the required table F-value to be significant at 0.05 level.

Since significant F-value was obtained, the results were

further subjected to post-hoc analysis and the results presented in Table-II proved that there was significant difference between High intensity plyometric training with mental training group and control group (MD: 4.69) and High intensity plyometric training without mental training group and control group (MD: 3.81). Comparing between the treatment groups, it was found that there was no significant difference between High intensity plyometric training with mental training and High intensity plyometric training without mental training group among long jumpers (MD: 0.88).

Thus, it was found that High intensity plyometric training with mental training and without mental training was significantly better than High intensity plyometric training without mental training control group in improving Breath holding time of the long jumpers.

### Discussions on hypothesis

For the purpose of the study, the following were hypothesized

1. It is hypothesized that there will be significant differences due to high intensity of plyometric training with and without mental training compared to control group on selected physiological variable, namely, breath holding time, among long jumpers.
2. It is hypothesized that comparing between experimental groups, high intensity of plyometric training with and without mental training there will be no significant differences on physiological variable, namely, breath holding time, among long jumpers.

The result presented in Table-I on physiological variable breath holding time due to 12 weeks high intensity plyometric with mental training (HPMTG) and without mental training (HPTG) proved to be significant at 0.05 level as the obtained F-value of 38.51 was greater than 3.16 to be significant.

The findings of this study proved that selected physiological variable Was improved due to high intensity plyometric training while the mental training or without mental training did not had any direct influence on selected physiological variables of long jumpers and the findings of this study were in agreement with the above previous researches.

### Findings

The results of the study proved that high intensity plyometric training with mental training and without mental training were significantly improved selected physiological variables breath holding time, compared to control group. It was further proved that there was no significant difference between experimental groups high intensity plyometric training with and without mental training.

### Conclusions

Within the limitations and delimitations of the study, the following conclusions were drawn.

1. It was concluded that high intensity plyometric training with mental training (HPMTG) and high intensity plyometric training without mental training (HPTG) were significantly improved bio-motor variable speed of long jumpers compared to control group. It was further proved that there was no significant difference between treatment groups HPMTG and HPTG.

2. It was concluded that high intensity plyometric training with mental training (HPMTG) and high intensity plyometric training without mental training (HPTG) were significantly improved physiological variable breath holding time of long jumpers compared to control group. It was further proved that there was no significant difference between treatment groups HPMTG and HPTG.

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