EFFECT OF HIGH INTENSITY POLYMETRIC TRAINING WITH AND WITHOUT MENTAL PRACTICES ON SELECTED PHYSIOLOGICAL VARIABLES OF LONG JUMPERS

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ABSTRACT

The purpose of the study was to find out the effect of high intensity plyometric training with and without mental training among long jumpers. To facilitate the study, 60 male students from the different college level of Andhra PradeshThe 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 variables such as, maximal oxygen uptake and anaerobic power. 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 programme. The post-test was conducted on the above said dependent variables after the experimental period for all the three groups. The different 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.

KEY WORDS: - High intensity Plyometric Training, Mental Training ,Long jumpers.

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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). As the amount of leisure time has increased in modern society time spent on sports has grown, while very few participate at the elite or Olympic level, there are many more who participate at the local or community level, for others involvement in sport is a passive one as spectators, coaches, umpires, teachers or sports writers. Sport is an Institutionalized competitive activity that involves vigorous physical exertion or the use of relatively complex physical skills by individuals whose participation is motivated by a combination of the intrinsic satisfaction associated with the activity itself and the external rewards earned through participation (Coakley, Jay J., 1998)

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 myotatic, 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.

Not all plyometric exercises are equal in intensity. Skipping exercises for example, are relatively light while single leg bounds and depth jumps are the most intense. A program should progress gradually from lower intensity drills to more advanced plyometric exercises particularly in an individual with less strength training experience. And depending upon the intensity of ploymetric training the benefits of the training are bound to differ on selected biomotor and physiological fitness of individuals.

Long jumpers involve in different training to improve their long jump performance. Most of the long jumpers are concentrating on plyometrics of different types. However, researches were scarce testing the influence of high intensity plyometric training with mental

training and without mental training on selected bio motor variables and physiological variables of long jumpers.

Hence, in this research, the investigator was interested to find out the effects of high intensity plyometric training with and without mental training on selected biomotor variables, speed, explosive power, flexibility and endurance and physiological variables, resting heart rate, breath holding time, maximal oxygen uptake and anaerobic power, among long jumpers.

OBJECTIVES OF THE STUDY

1. To formulate suitable high intensity plyometric 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 variables, maximal oxygen consumption and anaerobic power among long jumpers."

HYPOTHESES

1. It is hypothesised 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 variables, namely, maximal oxygen consumption and anaerobic power among long jumpers.

2. It is hypothesised that comparing between experimental groups, high intensity of plyometric training with and without mental training there will be no significant differences on physiological variables, namely, , maximal oxygen consumption and anaerobic power among long jumpers.

SIGNIFICANCE OF THE STUDY

Even though, we have many training programmes for the long jumpers, there is little attempt made to find out the effect of high intensity plyometric training with and without mental training on selected physiological variables. This study would be significant in the following ways:

1. The research is significant in suggesting suitable, high intensity plyometric training for long jumpers.

2. The research is significant in suggesting mental training that can be used in addition to their plyometric training or any other training to improve their long jump performance.

3. The research is significant in finding out the effect of high intensity plyometric training with and without mental training compared to control group on selected physiological variables of long jumpers.

4. The research is significant in finding out whether effect of high intensity plyometric training with mental training or high intensity plyometric training without mental training is beneficial to alter selected physiological variables of long jumpers.

5. The findings of the study would be helpful to determine the usefulness of high intensity plyometric training with mental training for long jumpers.

6. The findings of this study would be helpful to the coaches, sports scientists to adopt the plyometric training and mental training for the benefit of long jumpers.

LIMITATIONS

1. Heredity which contribute to both physical and mental efficiency will not be controlled.

2. Diet of the subject, general activity, motivation of the subjects is beyond the control of the researcher.

3. Practice sessions are not taken into consideration.

4. Academic pressure, like coaching class is not taken into consideration.

5. Certain factors like food habits, life style, daily routine, climatic conditions and the environmental factors which may have an effect on this study were not taken into consideration while interpreting the results.

DELIMITATIONS

The study was limited among college boys randomly selected from different college level in Andhra Pradesh.

This research confined among 60 college boys who represented their college level in Inter collegiate competitions in long jumper, in the age group of 19 to 25 years.

This study was delimited to the following Biomotor and physiological variables.

Physiological Variables-: VO_2 Max

Maximal Oxygen uptake

VO_2 max is the maximal oxygen uptake or the maximum volume of oxygen that can be utilized in one minute during maximal or exhaustive exercise. It is measured as milliliters of

oxygen used in one minute per kilogram of body weight "(Laurence E. Morehouse and Augustus T.Miller, 1967).

METHODOLOGY

In this Study , 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 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 variables from books, journals, and research papers. Taking into consideration the feasibility and availability of instruments the following variables were selected.

DEPENDENT VARIABLES

Physiological Variables

1. Maximal Oxygen uptake (VO_2 mas)

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.

EXPERIMETNAL 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 variables such as, maximal oxygen uptake and anaerobic power. 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 programme. The post-test was conducted on the above said dependent variables after the experimental period for all the three groups. The different 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.

COLLECTION OF DATA

The purpose of the study was to estimate the effects of high intensity plyometric training with mental training and without mental training on selected physiological variables among college level long jumpers. For this purpose, the researcher followed the following procedures.

The subjects of the study were selected at random and divided into three equal groups. Among the three groups, the control group was strictly under control, without undergoing any special activity. The experimental groups were undergone with the respected experimental treatments. The initial scores were collected prior to the experimental treatment from all the three groups on selected variables, maximal oxygen consumption (VO_2 max). After the completion of experimental treatment for 12 weeks, the subjects were again tested on the selected variables through standard tests and this forms the post-test scores. The collected data were tabulated for further statistical analysis.

TRAINING PROGRAMME

It is most essential to warm up before every session. The methods of doing high intensity plyometric training exercise were explained to the experimental groups before starting the training. The researcher himself demonstrated the plyometric exercises to the subjects. The training was given for a period of twelve weeks, three days per week on alternate days, except Sundays.

HIGH INTENSITY PLYOMETRIC TRAINING PROGRAMME

High intensity Plyometric exercises are included box jumping, bounding over the gurdles, two legs hop or banny hope, chest pass – medicine ball. These exercises are used to improve speed, strength, explosive power and endurance abilities.

TRAINING PROCEDURE

A pilot study was conducted before finalizing the training programme to ensure that intensity and duration of the programme were within the limits of the subjects capacity to practice the desired effect.

The training load was given on the basis of athlete's strength and his capacity to withstand to load for a period of time. The training work out was constructed accordingly to the jumping ability of the individual.

Maximal Oxygen Uptake (VO_2 max)

Cooper's 12 Minutes run / walk test was administered to determine maximal oxygen uptake of the subjects.

COOPER'S 12 MINUTES RUN OR WALK TEST

Purpose:- To measure the VO_2 max (cardio respiratory endurance)

Equipment:-Whistle, stopwatch, 400 meters track.

Description :-Subjects assemble behind the starting line .at the starting signal, they, run or walk as far as possible with in the 12 minutes time limit. An experienced pacer should accompany performers around the running area during the actual test. At the signal 'to stop 'performers should remain where they finished long enough for test administrators to record the distance covered. Ample time should be given for stretching and warm-up as well as cool down.

Scoring:- The distance in meters covered in 12 minutes.

The VO_2 max in ml / min / kg was calculated based on the formulae suggested by Cooper (1960) was:

$$\mathrm{VO_2\ max} = \frac{d_{12} - 505}{45}$$

Where, d_{12} is the distance (in meters) covered in 12 minutes.

STATISITICAL 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 biomotor 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 Vo_2 Max

The statistical analysis comparing the initial and final means of VO_2 Max 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-I

COMPUTATION OF ANALYSIS OF COVARIANCE OF VO_2 MAX

	HPMT Group	HPT Group	Control Group	Source of Variance	Sum Of Squares	Df	Mean Squares	Obtai-ned F
Pre-test Mean	42.67	40.57	41.26	Between	45.84	2	22.92	1.10
				Within	1190.35	57	20.88	
Post-test Mean	46.16	44.00	41.71	Between	197.59	2	98.80	5.88*
				Within	957.50	57	16.80	
Adjusted Post-test Mean	45.30	44.68	41.89	Between	131.78	2	65.89	11.24*
				Within	328.23	56	5.86	
Mean Diff	3.49	3.43	0.46					

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 VO_2Max on High intensity plyometric training with mental training group was 42.67, High intensity plyometric training without mental training group was 40.57 was and control group was 41.26. The obtained pre-test F-value was 1.10 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 VO_2 Max on High intensity plyometric training with mental training group was 46.16, High intensity plyometric training without mental training group was 44.00 was and control group was 41.71. The obtained post-test F-value was 5.88 and the required table F-value was 3.16, which proved that there was 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 11.24 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-II

Scheffe's Confidence Interval Test Scores on VO_2 Max

MEANS				Required C.I.
HPMT Group	HPT Group	Control Group	Mean Difference	
45.30	44.68		0.63	1.92
45.30		41.89	3.42*	1.92
	44.68	41.89	2.79*	1.92

HPMT: High intensity Plyometric with Mental Training
HPT High intensity Plyometric without mental training

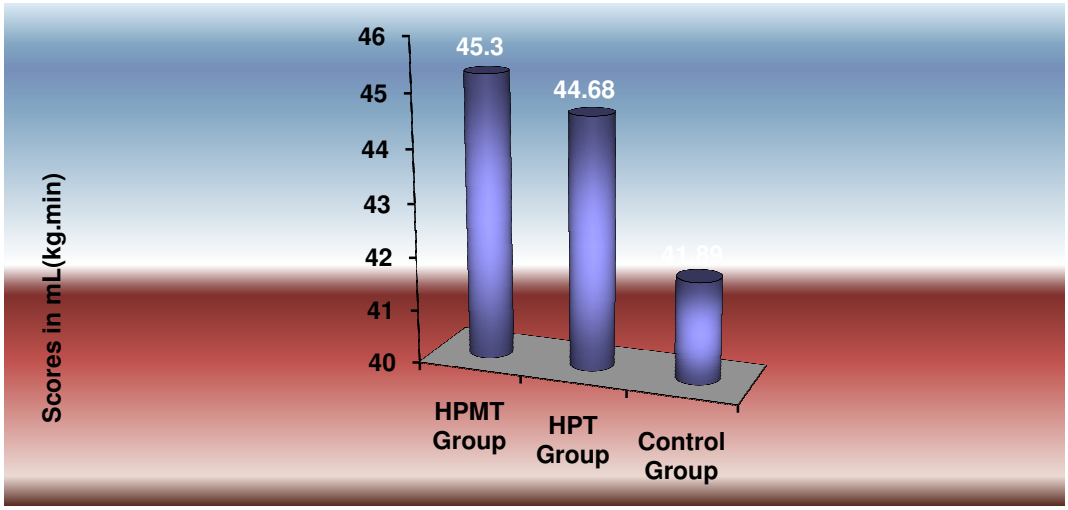
* Significant at 0.05 level

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: 3.42). There was significant difference between High intensity plyometric training without mental training group and control group (MD: 2.79). 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: 0.63).

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

Figure-I

BAR DIAGRAM ON ORDERED ADJUSTED MEANS ON VO_2 MAX



HPMT: High Intensity Plyometrics with Mental Training

HPT: High Intensity Plyometrics without mental Training

DISCUSSIONS ON HYPOTHESIS

Discussions on Findings on VO_2 Max

The effect of High intensity plyometric training with mental training and High intensity plyometric training without mental training on VO_2 Max 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 11.24 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: 3.42) and High intensity plyometric training without mental training group and control group (MD: 2.79). 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: 0.63).

Thus, it was found that High intensity plyometric training with mental training and without mental training were significantly better than control group in improving VO_2 Max of the long jumpers.

The result presented in Table-I on physiological variable VO_2 max 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 11.24 was greater than 3.16 to be significant. The post-hoc analysis results presented in Table XI proved that paired mean comparisons between HPMTG and control group and HPTG and control group were significant and the formulated hypothesis No. 3 was accepted for physiological variable VO_2 max.

The post-hoc analysis results in Table II also proved that the paired mean comparisons between experimental groups HPMTG and HPTG were not significant and the formulated hypothesis No. 4 was accepted for physiological variable VO_2 max.

Athletes devote a lot of time to the weight room during the off-season and pre-season for the purpose of developing a strength base. This has been recommended not only for the rigors of sport (Ebben, W.P. 1998) , but also for safe engagement in plyometric drills. The ballistic nature of plyometric drills can be quite taxing on the musculoskeletal system. Muscles used during plyometrics are rapidly lengthened and shortened lending to another name for plyometric drills: stretch-shortening cycle (SSC) exercises (Wilson, G.J., Elliott, B.C. and Wood, G.A. (1991). The physiology of a SSC can be defined as the reflexive shortening of a muscle to a rapid eccentric stretch. The governing mechanism for the SSC is the myotatic stretch reflex. This myotatic stretch reflex is one of the most simple and consequently most rapid of reflexes in the human body (Shultz, S.J. and Perrin, D.H. (1999). The reflex can be broken down as followed: Structures called muscle spindles, which sense changes in muscle length, are activated by a rapid

eccentric stretch. There is a brief period of time, termed the amortization phase, in which a nerve impulse is sent to the spinal cord from the muscle spindle and directly signals a motor nerve attached to muscle fibers being stretched. Once the motor nerve is signaled, the stretched fibers respond in a concentric manner. It has been stated the amortization phase of the myotatic stretch reflex can be reduced through plyometric training and thus may increase the speed of SSC movements in sport. (Walter, C.B. 1992) .

The findings of this study proved that selected physiological variables were 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.

CONCLUSIONS

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 physiological variable VO_2 max 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) was significantly improved physiological variable anaerobic power 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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