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Effect of plyometric training and plyometric training with protein supplementation on explosive power

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Abstract
The purpose of the study was to investigate the effect of plyometric training and plyometric training with protein supplementation on explosive power. To achieve the purpose of the study, forty five men inter collegiate volleyball players were selected as subjects. The age, height and weight of the subjects ranged from 18 to 22 years, 162 to 175 centimetres and 60 to 75 kilograms respectively.. The selected subjects were randomly assigned into three equal groups of 15 subjects each. Group I underwent plyometric training, group II underwent plyometric training with protein supplementation and group III acted as control. The experimental groups were trained up in which two modes of training were given independently with separate participants in each group. The pretest data were collected prior to the training programme and posttest data were collected immediately after the twelve weeks of plyometric training and plyometric training with protein supplementation from two experimental groups and a control group on selected dependent variables were statistically analyzed to find out the significant difference if any, by applying independent T test and the analysis of covariance (ANCOVA). Since three groups were involved, whenever the obtained 'F' ratio for adjusted post test means was found to be significant, the Scheffe's test was applied as post hoc test to determine the paired mean differences. In all the cases level of confidence was fixed at 0.05 for significance.

Keywords: plyometric training, protein supplementation, explosive power

Introduction

Dietary Supplements

Dietary supplement is an artificial invention projected to supplement the diet when taken by mouth as a pill, capsule, tablet, or liquid (USNIH, 2011). A supplement can supply nutrients either take out from food items or man-made, in person or in grouping, in order to boost the amount of their eating. The class of nutrient compounds contains vitamins, minerals, fiber, fatty acids and amino acids. Dietary supplements can also include substances that have not been deep-rooted as being necessary to life, but are advertised as having a beneficial biological effect, such as plant pigments or polyphenols. Animals can also be a source of supplement components, as for example collagen from chickens or fish.

Objectives of the Study

The aim of the study is to find effect of plyometric training and plyometric training with protein supplementation on explosive power.

Training Programme

In this study, training was done under close supervision with frequent adjustments in training intensity to maintain the desired training stimulus. The training programmes were scheduled for one session a day each session lasted between thirty to forty-five minutes approximately including warming up and warming down. During the training period, the experimental groups underwent their respective training programme three days per week (alternative days) for twelve weeks in addition to their curriculum. The group–I involved on plyometric training, Intensity starting from low to high @ 60-foot contact to @ 110-foot contact with 10 to 14 repetition and 2 to 3 sets followed from first week to twelve weeks.

Group–II involved on plyometric training with protein supplementation the training load was followed as like a plyometric training group schedule, in addition that the protein supplied for the subject, the protein powder was supplied at 0.8 grams per kg of the body weight of subjects on the training days (weekly three days). Training schedule given for group I and II is tabled in appendix II.

Administration of the Test

Vertical Jump

Purpose

To measure the explosive power of the leg, jump vertically upward.

Equipment

A yardstick, several pieces of chalk and a smooth wall surface of at least 12 feet from the floor are required.

Procedure

The performer should stand with one side toward the wall heels together and hold a 1-inch piece of chalk in the hand nearest to the wall keeping the heels on the floor he should reach upward as high as possible and make a mark on the wall. The performer then jumps as high as possible and makes another mark at the height of his jump.

Scoring

The number of inches between the reach and jump marks

measured to the nearest half inch is the score. Three to five trails are allowed and the best trail is recorded as the score.

Collection of the Data

The data were collected for explosive power. The pretest data were collected prior to the training programme and posttest data were collected immediately after the twelve weeks of plyometric training and plyometric training with protein supplementation from two experimental groups and a control group.

Experimental Design and Statistical Technique

The experimental design in this study was random group design involving 45 subjects, who were divided at random in to three group of fifteen each. All the three groups selected from the same population. No effort was made to equate the groups prior to the commencement of the experimental treatment. The pretest means of the selected dependent variable was used as a covariate. In order to nullify the initial differences, the data collected from the four groups prior to and post experimentation on selected dependent variables were statistically analysed to find out the significant difference if any, by applying independent T test and the analysis of covariance (ANCOVA). Since three groups were involved, whenever the obtained 'F' ratio for adjusted post test means was found to be significant, the Scheffe's test was applied as post hoc test to determine the paired mean differences. In all the cases level of confidence was fixed at 0.05 for significance.

Table 1: Dependent Variable and Test

S. No.	Variables	Criterion Measures	Unit of Measurement
1	Explosive Power	Vertical Jump Test	In centimetres

Table 2: Intra Class Co-Efficient Of Correlation on Selected Dependent Variable

S. No.	Criterion Variables	'R' Value
1	Explosive Power	0.89*

The pre and post test data collected from the experimental and control groups on explosive power were statistically analysed by ANCOVA and the results are presented in table- 3

Table 3: Analysis of Covariance on Explosive Power of Experimental and Control Groups

	Plyometric Training	Plyometric Training with Protein Supplements	Control Group	SOV	Sum of Squares	df	Mean squares	'F' ratio
Pre test Mean	37.26	37.40	37.53	B	0.53	2	0.26	0.25
SD	1.03	0.98	1.06	W	44.26	42	1.05	
Post test Mean	41.60	42.60	37.46	B	222.17	2	111.08	62.26*
SD	0.98	1.80	1.06	W	74.93	42	1.78	
Adjusted Post test Mean	41.66	42.60	37.40	B	228.62	2	114.31	72.42*
				W	64.71	41	1.57	

(The required table value for significance at 0.05 level of confidence with degrees of freedom 2 and 42 is 3.23 and degree of freedom 2 and 41 is 3.23)
*Significant at .05 level of confidence

Table 3 shows that the pre-test means and standard deviation on explosive power of plyometric training, plyometric training with protein supplementation groups and control group are 37.23 $\pm$ 1.03, 37.40 $\pm$ 0.98 and 37.53 $\pm$ 1.06 respectively. The obtained 'F' ratio value of 0.25 for pre test means on explosive power of plyometric training, plyometric training with protein supplementation groups and control group were less than the required table value of 3.23 for the degrees of freedom 2 and 42 at 0.05 level of confidence. It reveals that there is statistically insignificant difference among the plyometric training, plyometric training with protein supplementation groups and control group during pre test period. It inferred that the random assignment of the subjects for the three groups is successful.

The post test means and standard deviation on explosive power of plyometric training, plyometric training with protein supplementation groups and control group are 41.60 $\pm$ 0.98, 42.60 $\pm$ 1.80 and 37.46 $\pm$ 1.06 respectively. The obtained 'F' ratio value of 62.26 for post test means on explosive power of plyometric training, plyometric training with protein supplementation groups and control group were higher than the required table value of 3.23 for the degrees of freedom 2 and 42 at 0.05 level of confidence.

The adjusted post test means on explosive power of plyometric training, plyometric training with protein supplementation groups and control groups are 41.66, 42.60 and 37.40 respectively. The obtained 'F' ratio value of 72.42 on explosive power were greater than the required table value of 3.23 for the degrees of freedom 2 and 42 at 0.05 level of confidence. It is observed from this finding that significant differences exist among the adjusted post test means of experimental and control groups on explosive power.

Since, the adjusted post test 'F' ratio value is found to be significant the Scheffe's test is applied as post hoc test to determine the paired mean differences, and it is presented in table 4.

Table 4: Scheffe's Test for the Difference between the Adjusted Post Test Paired Means of Explosive Power

Adjusted Post Test Means			DM	CI
Plyometric Training	Plyometric Training with Protein Supplements	Control Group		
41.66	42.60		0.94*	0.76
41.66		37.40	4.26*	0.76
	42.60	37.40	5.20*	0.76

*significant

Table 4. shows the Scheffe's test results that there are significant differences between the adjusted post tests means of plyometric training and plyometric training with protein

supplementation groups; plyometric training and control groups; plyometric training with protein supplementation group and control group on explosive power. Moreover, plyometric training with protein supplementation group had high impact to increase the explosive power of the volleyball players.

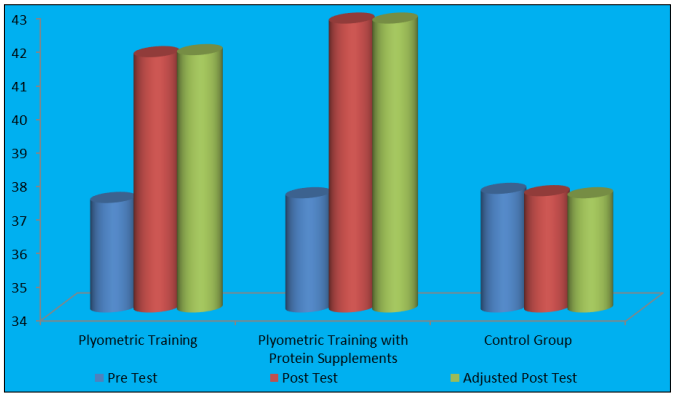

Fig 1: Cylinder Diagram Showing the Mean Value on Explosive Power of Experimental and Control Groups

Result

The result of the study showed that significant differences exist among the experimental and control groups on explosive power. Hence among the experimental group the plyometric training with protein supplementation group had high improvements on explosive power. The following studies are supporting my finding of the study.

Fabian, *et al*., (2017) [5] investigated the effects of a plyometric training program, with or without beta-alanine supplementation, on maximal-intensity and endurance performance in female soccer players during an in-season training period. Result showed that plyometric training groups improved in explosive jumping.

Ramirez, *et al*., (2015) [5] examined the effects of plyometric training and creatine supplementation on maximal intensity exercise and endurance in female soccer players. Results showed that plyometric training groups improved jumps. Jon (2008) investigated the effect of creatine supplementation on the body composition, muscular strength, and power of 36 female collegiate volleyball players across 10 weeks of training. He concluded that vertical jump improved significantly in female collegiate volleyball players. Creatine supplementation, in conjunction with a good conditioning program, can significantly increase muscular strength and power, to an extent that conditioning programs alone do not match (Haff, *et al*., 2000; Stout, *et al*., 1999) [6].

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