

Effect of Plyometric Training Isotonic Training and Combination of Plyometric and Isotonic Training on Leg Strength and Muscular Endurance

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Abstract

The purpose of the present study was to find the effect of plyometric training, isotonic and combination of plyometric and isotonic training on, leg strength and muscular endurance. For this purpose, forty male students studying in the studying Bachelor of Physical Education in the Department of Physical Education and Sports Sciences, Annamalai University, Annamalainagar, Tamilnadu, in the age group of 18 – 23 years were selected as subjects. They were divided into four equal groups, each group consisted of ten subjects, in which group – I underwent plyometric training, group – II underwent isotonic training group, group – III underwent combined plyometric and isotonic training and group – IV acted as control group. The training period for this study was three days in a week for twelve weeks. Prior and after the training period the subjects were tested for leg strength and muscular endurance. The selected criterion variables, such as, leg strength and muscular endurance, were tested by administering, 50 meters dash and sit-ups test. The statistical toll used for this study is analysis of covariance (ANCOVA). Whenever the F ratio was significant, the Scheffé *S* was applied as post-hoc test. From the result of the study, it was concluded that all the training groups have improved leg strength, and muscular endurance.

INTRODUCTION

Sports training is a scientifically based and pedagogically organized process which through planned and systematic effect on performance ability and performance readiness aims at sports perfection and performance improvement as well as at the contest in sports competition.

Plyometrics is a type of exercise training designed to produce fast, powerful movements, and improve the functions of the nervous system, generally for the purpose of improving performance in sports. Plyometrics has been shown across the literature to be beneficial to a variety of athletes. Benefits range from injury prevention, power development and sprint performance amongst others.

While plyometrics assists in rapid force development (power), weight training assists in maximal force output (strength). Power refers to the combined factors of leg strength and strength.

Isotonic exercise is a form of exercise which involves controlled contraction and extension of muscles and mobilization of the joints around those muscles. For isotonic exercise to be isotonic, the tension involved must remain constant throughout the exercise, rather than fluctuating.

Leg strength is very essential for sports persons, especially athletes. The strength of a muscle is related to its cross sectional area or girth. The larger the muscle, the muscle, the stronger it is. Strength training increased the contractile protein that gives the

muscle its pulling power.

Clarke stated that endurance is basic in measuring organic capacity believing that if one is able to run or swim more than the normal distance without undue fatigue he is in good physical conditions.

Methods

In this study it was to find out the effect of plyometric, isotonic and combined plyometric and isotonic trainings on leg strength and muscular endurance. To achieve the purpose, forty male students studying Bachelor of Physical Education in the Department of Physical Education and Sports Sciences, Annamalai University, Annamalainagar, Tamilnadu, in the age group of 18 – 23 years were selected as subjects. They were divided into four equal groups of ten each, in which, group – I underwent plyometric training, group – II underwent isotonic training, group – III underwent combined plyometric and isotonic training and group – IV acted as control group who did not participate any special training apart from the regular activities. For every training programme there would be a change in various structure and systems in human body. So, the researcher consulted with the experts then selected the following criterion variables: 1. leg strength and 2. muscular endurance. The selected criterion variables such as, leg strength and muscular endurance, were tested by administering, 50 meters dash and sit-ups test.

Analysis of the Data

Analysis of covariance was used to determine the differences, if any, among the adjusted post test means on selected criterion variables separately. Whenever the 'F' ratio for adjusted posttest mean was found to be significant, the Scheffé S test was applied as post-hoc test. The level of significance was fixed at .05 level of confidence to test the 'F' ratio obtained by analysis of covariance.

Table – I

Analysis of Covariance and 'F' ratio for Leg strength and Muscular Endurance of Plyometric Training Isotonic Training and Combination of Plyometric and Isotonic Training and Control Groups

Variable Name	Group Name	Plyometric Training Group	Isotonic Training Group	Plyometric and Isotonic Training Group	Control Group	'F' Ratio
Leg strength (in kgs)	Pre-test Mean \pm S.D	71.9 \pm 4.533	70.9 \pm 5.343	70.9 \pm 5.705	72.6 \pm 4.502	0.271
	Post-test Mean \pm S.D.	74.3 \pm 4.057	73.5 \pm 5.523	75.3 \pm 5.056	72.6 \pm 3.534	0.622
	Adj. Post-test Mean	74.011	74.101	75.901	71.687	26.907*
Muscular Endurance (in Nos./min)	Pre-test Mean \pm S.D	32.70 \pm 2.003	34.00 \pm 1.886	32.00 \pm 1.633	32.70 \pm 2.163	1.869
	Post-test Mean \pm S.D.	35.10 \pm 2.025	36.40 \pm 1.776	36.40 \pm 1.647	31.40 \pm 1.647	17.635
	Adj. Post-test Mean	35.212	35.539	37.037	31.512	49.564*

* Significant at .05 level of confidence. (The table value required for significant at .05 level with df 3 and 36 and 3 and 35 are 2.85 and 2.87 respectively).

Table - II

Scheffé S Test for the Difference Between the Adjusted Post-Test Means on Leg strength and Muscular Endurance

Adjusted Post-test Mean of Leg strength					
Plyometric Training Group	Isotonic Training Group	Plyometric and Isotonic Training Group	Control Group	Mean Difference	Confidence Interval at 0.05 level
74.011	74.101			0.09	1.3700291
74.011		75.901		1.89*	1.3700291
74.011			71.687	2.324*	1.3700291
	74.101	75.901		1.80*	1.3700291
	74.101		71.687	2.414*	1.3700291
		75.901	71.687	4.214*	1.3700291
Adjusted Post-test Mean of Muscular Endurance					
Plyometric Training Group	Isotonic Training Group	Plyometric and Isotonic Training Group	Control Group	Mean Difference	Confidence Interval at 0.05 level
35.212	35.539			0.327	1.3763
35.212		37.037		1.825*	1.3763
35.212			31.512	3.70*	1.3763
	35.539	37.037		1.507*	1.3763
	35.539		31.512	4.027*	1.3763
		37.037	31.512	5.525*	1.3763

* Significant at .05 level of confidence.

Results

Table – I showed that there was a significant difference among plyometric training, isotonic and combined plyometric and isotonic training groups on leg strength, and muscular endurance.

Table – II shows that the Scheffé *S* test on leg strength for the difference between adjusted post-test mean of plyometric training group and combination of plyometric and isotonic training group (1.89), plyometric training group and control group (2.324), isotonic training group and combination of plyometric and isotonic training group (1.80), isotonic training group and control group (2.414), and combination plyometric and isotonic training group and control group (4.214) which were significant at .05 level of confidence. But there was no significant difference was exists between plyometric training group and and combination plyometric and isotonic training group (0.09) on leg strength.

Table – II shows that the Scheffé *S* test on muscular endurance for the difference between adjusted post-test mean difference of plyometric training group and combination plyometric and isotonic training group (1.825), plyometric training group and control group (3.70), isotonic training group and combination of plyometric and isotonic training group (1.507), plyometric training group and control group (4.027) and combination of plyometric and isotonic training group (5.525) were significant at .05 level of confidence. But there was no significant difference between plyometric training group and isotonic training group (0.327) on muscular endurance after the respective training programmes.

Conclusions

1. It was concluded from the results of the study, leg strength was improved for all the training groups and combination of plyometric and isotonic training group which was significantly improved the leg strength.

2. It was also concluded that the muscular endurance has improved significantly after the respective training programmes.

3. When compared with the control group, all the training groups has significantly improved in leg strength and muscular endurance, whereas, isotonic training did not improve the leg strength when compared with the control group.

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