Effect of Plyometric Training and Strength and Plyometric Training on Speed Leg strength and Anaerobic Power

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Abstract

The purpose of the present study was to find out the effect of plyometric training and strength and plyometric training on speed, leg strength and anaerobic power. For this purpose, thirty male trainees from India Sports Promotion Academy, Y.M.C.A., Nandanam, Chennai, Tamilnadu, in the age group of 15 – 16 years were selected as subjects. They were divided into three equal groups, each group consisted of ten subjects, in which group – I underwent plyometric training, group – II underwent strength and plyometric training and group – III acted as control group. The training period for this study was three days in a week for twelve weeks. Prior to and after the training period the subjects were tested for speed, leg strength and anaerobic power. The selected criterion variables, such as, speed, leg strength and anaerobic power, were tested by administering, 50 meters dash, dynamometer and Margaria Kalamen Anaerobic Power test. It was concluded from the results of the study that both the training groups have improved speed, leg strength and anaerobic power.

Keywords: Plyometric training, Strength training, Anaerobic power

Introduction

Physical training is one of the most important ingredients in training to achieve high performance. The objectives of physical training are to increase the athlete's physiological potential and to develop biomotor abilities to the highest standards (Tudor O. Bompa, 1999).

Sports training is a process of athletic improvement, which is conducted on the basis of scientific principles and which, through systematic development of mental and physical efficiency, capacity and motivation, enables the athletes to produce outstanding and record breaking athletic performances (Dietrich Harre, 1982).

While planning the dynamics of training, consider these aspects, referred to as the variables of training according to the functional and psychological characteristics of a competition. Throughout the training phases preceding a competition, define which component to emphasize and achieve the planned performance objective (Vladimir M.Zatsiorsky, 1995).

Plyometric training enhances the tolerance of the muscle for increased stretch loads. This increased tolerance develops efficiency in the stretch shortening cycle of muscle action (www.gambetta.com).

Resistance training - sometimes called strength training or strength training - is a "specialized method of conditioning designed to increase muscle strength, muscle endurance and muscle power," according to the American Sports Medicine Institute (ASMI) (Edward G. Mcfarland, www.google.com).

Eicher (1975) is of the opinion that speed is the product of two factors stride length and frequency. Increasing either factor automatically increase a runner's sprinting speed.

Strengthening one's muscles through resistance training offers many benefits and makes it easier to do one's daily routine. One can find that carrying your briefcase, doing laundry and hauling groceries becomes easier when one's arm and chest muscles are toned (Edward G. Mcfarland, www.google.com).

Leg strength is possibly the most neglected and undervalued component of physical fitness. Lack of leg strength can be a cause of poor performance and inefficient technique can be a possible underlying cause for many of the strain and tear type muscle injuries found in sports. The muscle may have to work harder to over- come resistance and by increasing the possible range of movement at various joints. The strength work is compensated with adequate leg strength exercise to provide a balanced approach and subsequent development (Rex Hazeldine, 1985).

Anaerobic power is energy that is stored in muscles and that can be accessed without the use of oxygen. There are two systems that utilize this type of power, the phosphogen system and the lactic acid system (www.wisegeek.com)

Methods

In this study it was to find out the effect of plyometric training and strength and plyometric training on speed, leg strength and anaerobic power. To achieve the purpose thirty male trainees from India Sports Promotion Academy, Y.M.C.A., Nandanam, Chennai, Tamilnadu, in the age group of 15 – 16 years were selected as subjects. They were divided into three equal groups of ten each, in which, group - I (n=10) underwent plyometric training, group - II (n=10) underwent strength training with plyometric training for three days per week for twelve weeks and group - III (n=10) acted as control 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 variables as criterion variables: 1. Speed, 2. Leg strength and 3. Anaerobic power. The selected criterion variables such as, speed, leg strength and anaerobic power, were tested by administering, 50 meters dash, dynamometer and Margaria Kalamen Anaerobic Power 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 Speed, Leg strength and Anaerobic Power of Plyometric Group Combined Strength and Plyometric Training Group and Control Group

Variable Name	Group Name	Plyometric Training Group	Strength and Plyometric Training Group	Control Group	'F' Ratio
Speed (in Sec)	Pre-test Mean ± S.D	7.07± 0.3302	7.28± 0.537	7.28± 0.471	0.712
	Post-test Mean ± S.D.	6.75± 0.303	6.83± 0.455	7.26± 0.497	4.137*
	Adj. Post-test Mean ± S.D.	6.879	6.765	7.195	78.51*
Leg strength (in Kgs)	Pre-test Mean ± S.D	70.00± 2.93	67.20± 4.94	70.30± 3.075	2.068
	Post-test Mean ± S.D.	72.15± 3.33	72.90± 4.43	70.75± 3.39	0.846
	Adj. Post-test Mean ± S.D.	71.429	74.601	69.77	14.537*
Anaerobic Power (in Kg m/sec)	Pre-test Mean ± S.D	80.692± 4.17	77.467± 3.73	76.405± 4.32	2.992
	Post-test Mean ± S.D.	82.674± 3.94	79.507± 3.952	76.357± 4.64	5.682*
	Adj. Post-test Mean ± S.D.	80.141	80.236	78.161	23.877*

* Significant at .05 level of confidence. (The table value required for significance at .05 level with df 2 and 27 and 2 and 26 are 3.35 and 3.37 respectively).

Table-II
Scheffe S Test for the Difference between the Adjusted Post-Test Mean of Speed, Leg Strength and Anaerobic Power

Adjusted Post-test Mean on Speed				
Plyometric Training Group	**Strength and Plyometric Training Group**	**Control group**	**Mean Difference**	**Confidence interval at .05 level**
6.879	6.765		0.114*	0.08999
6.879		7.195	0.316*	0.08999
	6.765	7.195	0.43*	0.08999
Adjusted Post-test Mean on Leg Strength				
Plyometric Training Group	**Strength and Plyometric Training Group**	**Control group**	**Mean Difference**	**Confidence interval at .05 level**
71.429	74.601		3.352*	2.2124
71.429		69.77	1.659	2.2124
	74.601	69.77	4.831*	2.2124
Adjusted Post-test Mean on Anaerobic Power				
Plyometric Training Group	**Combination of Strength and Plyometric Training Group**	**Control group**	**Mean Difference**	**Confidence interval at .05 level**
80.141	80.236		0.095	0.8452
80.141		78.161	1.98*	0.8452
	80.236	78.161	2.075*	0.8452

* Significant at .05 level of confidence

Results

Table – I showed that there was a significant difference among plyometric training group, strength and plyometric training group and control group on speed, leg strength and anaerobic power.

Table – II shows that the Scheffe *S* test on speed for the difference between adjusted post-test mean of plyometric training and control groups (0.114), plyometric training group and strength and plyometric training (0.316) and strength and plyometric training and control groups (0.43), which were significant at .05 level of confidence.

Table – II also shows that the Scheffe *S* test on leg strength for the difference between adjusted post-test mean difference of plyometric training group and strength and plyometric training groups (3.352) and strength and plyometric training and control groups (4.831) were significant at .05 level of confidence. But there was no significant difference between plyometric training group and control groups (1.659) on leg strength after the training programme.

Table – II shows that the Scheffe *S* test on anaerobic power for the difference between adjusted post-test mean difference of plyometric training group and control group (1.98) and strength and plyometric training and control groups (2.075) were significant at .05 level of confidence. But there was no significant difference between plyometric training group and strength and plyometric training groups (0.095) on anaerobic power after the training programme.

Conclusions

1. It was concluded from the results of the study, the leg strength and anaerobic power has improved significantly after the respective training programme. But there was no significant improvement in leg strength for plyometric training group, when compared with the control group.

2. When compared with the control group, both the training groups has significantly improved in both the criterion variables, such as, speed and anaerobic power and for plyometric training group, leg strength was not improved significantly.

3. It was also concluded from the results of the study, that there was a significant difference between the training groups on speed and leg strength, not in anaerobic power.

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