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COMPARATIVE ANALYSIS OF PROGRESSIVE PLYOMETRIC TRAINING AND PROGRESSIVE PLYOMETRIC TRAINING FOLLOWED BY REVERSIBILITY ON SPEED

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ABSTRACT

This study was designed to analyze the effect of progressive plyometric training and progressive plyometric training followed by reversibility on speed. The achieve the purpose of this study, 45 men students from bachelor's degree course in the department of physical education and sports sciences, Acharya Nagarjuna University Ongole Campus, Ongole, Andhra Pradesh, India were selected as subject. The subject were assigned at random into three groups of fifteen each (n=15). Group-I underwent progressive plyometric training, Group II underwent progressive plyometric training followed by reversibility and Group III acted as control. Control group was restricted to participate in any specific training. The speed was selected as dependent variable. The pre and post test random group design was used as experimental design. The collected data from the three groups prior to and immediately after the training programme on selected criterion variable was statistically examined for significant difference, if any, by applying Analysis of Covariance (ANCOVA). Since three groups were involved whenever the 'F' ratio was found to be significant for adjusted means, Scheffe's test was followed as a post hoc test to determine which of the paired means difference was significant. The results of the reveals that due to the influence of progressive plyometric training (2.94%) and progressive plyometric training followed by reversibility (2.90%) the speed was significantly improved. It is also concluded that progressive plyometric training followed by reversibility group is significantly better than progressive plyometric training followed by reversibility group in improving Speed.

KEYWORDS: Progressive plyometric training, Reversibility and Speed.

INTRODUCTION

Speed and strength are integral components of fitness found in varying degrees in virtually all athletic movements. Simply put the combination of speed and strength is power. For many years, coaches and athletes have sought to improve power in order to enhance performance. Throughout this century and no doubt long before, jumping, bounding and hopping exercises have been used in various ways to enhance athletic performance. In recent years, this distinct method of training for power or explosiveness has been termed plyometric (Bompa *et al.*, 2005). One form of training that theoretically proposes to bridge the gap between speed and strength is plyometric training. The concept of plyometric training has been the focus of controversy among sports scientists and trainers in recent years. The research literature does not provide all the answers, and practitioners report different levels of success using a variety of resistance modes and techniques. The challenge of human muscle power enhancement for sports performance is based on the use of a variety of training approaches and it is generally agreed in the literature that some form of resistance exercise involving near maximal efforts will improve power output.

Plyometric training is used in a wide variety of sports to increase athletic performance. Plyometrics is a form of training designed to increase muscular power. There has been little research conducted as to what constitutes optimal guidelines for a plyometrics program, however what has been proven is that it is an effective method of training for increasing muscular power where there already exists a solid strength base. Among sport conditioning coaches, there is considerable discussion regarding the efficiency of training methods that improve body strength and power. But the best method for achieving improvement in muscular strength and muscular power are disputed. Plyometric training is well-established training method and vital necessary for athletes and players; however, there is a lack of information regarding the effect of progressive plyometric training and progressive plyometric training followed by reversibility on speed. Through the study of science and various sports training, researchers have developed a greater understanding on how the human body reacts to exercise, training and many other stimuli. The effect of progressive plyometric training and progressive plyometric training followed by reversibility is useful research objectives and it has drawn the attention of the investigator. The present scientific study is one of the efforts to explore and suggest a best scientific method for the development of speed parameters.

METHODOLOGY

SUBJECTS AND VARIABLES

The purpose of the study was to investigate the effect of progressive plyometric training and progressive plyometric training followed by reversibility on speed. To achieve the purpose of the study 45 male students studying bachelor's degree course in the department of physical education and sports sciences, Acharya Nagarjuna University Ongole Campus, Andhra Pradesh, India during the academic year 2014-2015 were selected as subjects at random by lot method from total of 100 students. They were divided into three groups of fifteen each (n=15). Group-I underwent progressive plyometric training, group-II underwent progressive plyometric training followed by reversibility and group III acted as control. Control group was restricted to participate in any specific training. The dependent variable selected was speed and it was assessed by conducting 50 meters run test. The purpose, nature and importance of experiment and testing periods were explained to the subjects. The data collected from the experimental and control groups as these students were new to plyometric training regime, the subjects cleared the minimum strength requirement test prescribed by Voight and Draovitch, which consisted of five push-ups, five squat thrust, standing long jump and skipping rope for thirty seconds.

TRAINING PROGRAMME

During the training period, the experimental groups underwent their respective training programmes in addition to their regular physical education programme of the course of study as per the curriculum. Group-I had undergone progressive plyometric training for three days per week for twelve weeks and group II had undergone progressive plyometric training for three days per week for nine weeks and followed by reversibility for two days per week for remaining three weeks. The principle of overload for group-I had been applied at every four weeks up to the twelfth week to reach the high intensity whereas group-II was attained the high intensity at the ninth week itself and then for remaining three weeks the load was deliberately reduced. The duration of training sessions in all the days was between 45 minutes and an hour approximately, which included warming up and limbering down. Group III acted as control who did not participate in any specific training on par with experimental groups. However, they performed the regular physical education programme of the course of the study. The experimental groups underwent their respective training programs during evening hours under strict supervision of the investigator. To reduce the possibility of injury the training was conducted on the grassland. The training schedules for the experimental groups were designed in response to the pilot study and also based on the guidelines by Donald A. Chu (1992).

STATISTICAL PROCEDURE

The pre and post test random group design was used as experimental design in which forty-five men subjects were divided into three groups of fifteen each at random. No attempt was made to equate the group's in any manner. The subjects were tested on selected criterion variable speed prior to and immediately after the training programme. The collected data from the three groups prior to and immediately after the training programme on speed was statistically examined for significant difference, if any, by applying analysis of covariance (ANCOVA). Since three groups were involved whenever the 'F' ratio was found to be significant for adjusted means, Scheffe's test was followed as a post hoc test to determine which of the paired means difference was significant. Magnitudes of improvements were computed for all the groups on selected criterion variables separately as suggested by Jerry Thomas and Jack Nelson. In all cases .05 level was fixed as level of confidence.

RESULT

The analysis of covariance on speed of progressive plyometric training group, progressive plyometric training followed by reversibility group and control group have been analyzed and presented in table-1.

TABLE I
ANALYSIS OF COVARIANCE ON SPEED OF PROGRESSIVE PLYOMETRIC TRAINING GROUP, PROGRESSIVE PLYOMETRIC TRAINING FOLLOWED BY REVERSIBILITY GROUP AND CONTROL GROUP

	Progressive plyometric training group	Progressive plyometric training followed by reversibility group	Control Group	S o V	Sum of Squares	df	Mean Squares	'F' ratio
Pre test Mean SD	6.8	6.9	6.7	B	0.51	2	0.255	1.16
	0.48	0.51	0.41	W	9.24	42	0.220	
Post test	6.6	6.7	6.7	B	0.08	2	0.040	0.19

Mean SD	0.51	0.43	0.42	W	8.64	42	0.206	
Adjusted Post test Mean	6.6	6.4	6.8	B	0.57	2	0.285	20.36*
				W	0.59	41	0.014	
Magnitude of Improvement	**2.94%**	**2.90%**	**0%**					

Significant at .05 level of confidence.
The table value required for significance at .05 level with df 2 and 42 and 2 and 41 are 3.22 and 3.23 respectively. (Speed performance in 1/10th of a second)

Table-I shows that the pre test mean values of speed for progressive plyometric training group, progressive plyometric training followed by reversibility group and control group are 6.8, 6.9 and 6.7 seconds respectively. The obtained 'F' ratio of 1.16 for pre test is less than the table value of 3.22 for df 2 and 42 required for significance at .05 level of confidence. The post test mean values of speed for progressive plyometric training group, progressive plyometric training followed by reversibility group and control group are 6.6, 6.7 and 6.7 seconds respectively. The obtained 'F' ratio of 0.19 for post test is less than the table value of 3.22 for df 2 and 42 required for significance at .05 level of confidence. The adjusted post test mean values of speed for progressive plyometric training group progressive plyometric training followed by reversibility group and control group are 6.6, 6.4 and 6.8 seconds respectively. The obtained 'F' ratio of 20.36 for adjusted post test is more than the table value of 3.23 for df 2 and 41 required for significance a .05 level of confidence. The magnitude of improvement of speed due to the influence of the respective training means of progressive plyometric training group, progressive plyometric training followed by reversibility group and control group are 2.94%, 2.90% and 0% respectively. The results of the study indicates that there is a significant difference among the adjusted post test means of progressive plyometric training group, progressive plyometric training followed by reversibility group and control group on the development of speed. To determine which of the three paired means had a significant difference, Scheffe's test was applied as post hoc test and the results are presented in table-II.

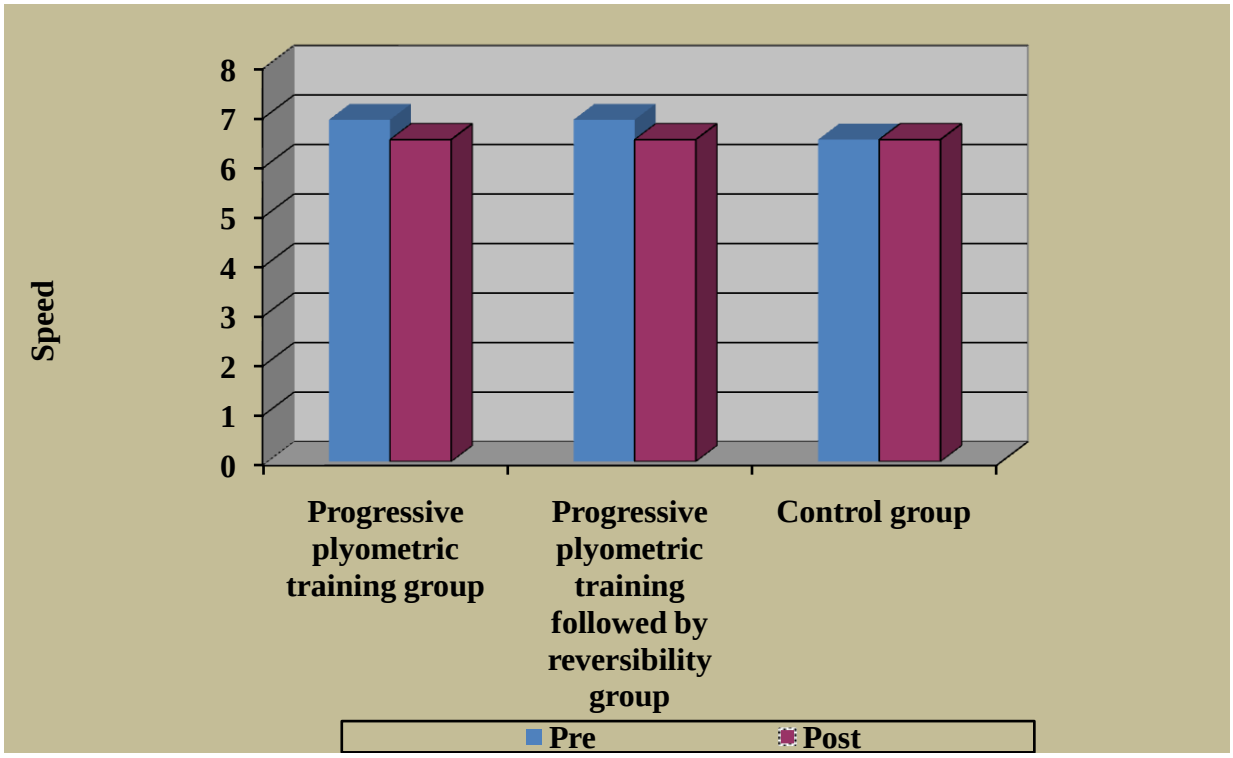
TABLE II
SCHEFFE'S TEST FOR THE DIFFERENCES BETWEEN THE ADJUSTED POST TEST PAIRED MEANS ON SPEED

Adjusted Means			Mean Difference	Confidence Interval
Progressive plyometric training group	**Progressive plyometric training followed by reversibility group**	**Control Group**		
6.6	6.4	-	0.20*	0.11
6.6	-	6.8	0.20*	0.11
-	6.4	6.8	0.40*	0.11

Significant at .05 level of confidence.
(Speed performance in 1/10th of a second).

Table II shows that the adjusted post test mean differences on speed between progressive plyometric training group and progressive plyometric training followed by reversibility group, progressive plyometric training group and control group and progressive plyometric training followed by reversibility group and control group as 0.20, 0.20 and 0.40 respectively. They are higher than the confidence interval value of 0.11 which shows significant difference at .05 level of confidence. It may be concluded from the results of the study that there is a significant difference between the adjusted post test means of progressive plyometric training group and progressive plyometric training followed by reversibility group, progressive plyometric training group and control group and progressive plyometric training followed by reversibility group and control group on speed. The mean values of progressive plyometric training group, progressive plyometric training followed by reversibility group and control group on speed is graphically represented in figure-I.

FIGURE I
MEAN VALUES OF PROGRESSIVE PLYOMETRIC TRAINING GROUP, PROGRESSIVE PLYOMETRIC TRAINING FOLLOWED BY REVERSIBILITY GROUP AND CONTROL GROUP ON SPEED



DISCUSSION

The results of the study indicates that both the experimental groups namely progressive plyometric training and progressive plyometric training followed by reversibility groups had significantly improved the selected dependent variable speed when compared to the control group as it did not participate in any of the special training programme apart from the regular physical education activities. These findings are also in agreement with the findings of Brown et al., (1986) who conducted a study to find out the effects of plyometric exercises on 15 year old subjects in which plyometric group experienced significant gain in Speed, stride frequency and stride length. According to Reddy, (1993) plyometric training increased speed, stride length, stride frequency and anaerobic power than that of the resistance training. Bompa (1999) experimented and suggested that plyometric exercise can often yield a significant gain in physical ability and optimization of athletic performance. Plyometric training influence the starting power and acceleration power during sprinting.

A wide variety of training studies shows that plyometric can improve performance in vertical jumping, long jumping, sprinting and sprint cycling. It also appears that a relatively small amount of plyometric training is required to improve performance in these tasks. Just one or two types of plyometric exercise completed 1-3 times a week for 6-12 weeks can significantly improve motor performance (Blackey & Southard, 1987; Gehri et al., 1998; Matavulj et al., 2001). In addition, several studies on plyometric training have demonstrated that a significant increase in sprinting (Chimera et al., 2004; Kotzamanidis, 2006) and distance-running performance. Also consistent with previous studies Abass (2009) found that plyometrics exercises (BWT) with depth jumping and rebound jumping characteristics are best used in developing muscle strength of the lower extremities.

CONCLUSION

The results of the reveals that due to the influence of progressive plyometric training (2.94%) and progressive plyometric training followed by reversibility (2.90%) the speed was significantly improved. It is also concluded that progressive plyometric training followed by reversibility group is significantly better than plyometric training group in improving speed. From the perspective of the above-discussed results, progressive plyometric training followed by reversibility could well be recommended for healthy individuals aiming to improve not only their strength and power, but also other speed performances.

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