



EFFECT OF WEIGHT TRAINING PLYOMETRIC TRAINING AND COMPLEX TRAINING ON SPEED PERFORMANCE

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ABSTRACT

The purpose of the study is to find out the effect of weight training, plyometric training and complex training on speed performance, thirty school boys from summer coaching camp which is conducted by Sports Development Authority of Tamilnadu, Thanjavur unit, Tamil Nadu, India, was selected as participants and they were ranged from 16 to 19 years. The selected participants were randomly assigned to one of Three groups of ten each (n=10). The Group I underwent weight training, Group II underwent plyometric training and Group III underwent complex training for duration of 8 week of 24 morning sessions with alternative three days per week in addition to the regular programme in summer coaching camp. The Criterion variable speed and acceleration were selected as a dependent variables and the selected dependent variables were assessed by the standardized test items. Speed was assessed by 50 meters run unit of measurement in seconds and acceleration was assessed by 30 meters fly run unit of measurement in seconds. The experimental design selected for this study was pre and post test random group design. The data were collected from each participant before and after the training period and statistically analyzed by using dependent 't' test and analysis of covariance (ANCOVA) was applied to find out significant difference if any between the experimental group. It was found that there was a significant improvement and significant different exist due to the effect of weight training, plyometric training and complex training on speed performance.

Key Words: *Complex Training and Plyometric Training*

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INTRODUCTION

Today athletes prepare themselves for a goal through training. The physiological goal is to improve body function and optimize athletic performance, training is primarily a systematic athletic activity of long duration, well planned, which is also progressive and individually graded. To enrich human physiological and psychological functions are modeled to meet demanding tasks (**Bomba, 1999**).

The term "training" is used to denote different things. In the broad sense, training today is used to mean any organized instruction whose aim is to increase man's physical, psychological, intellectual or mechanical performance rapidly (**Hare, 1982**).

Weight training exercises, which cannot be performed at maximum velocity and power throughout the movement, but plyometric exercise is a more efficient tool for developing maximum power through the range of motion. Plyometrics prior to the contraction required to perform a movement this pre-stretch which takes the form of a counter movement enables them to contract more rapidly.

Plyometrics is an exercise that enables a muscle to reach maximum strength in a shortest possible time and also rapidly know as an exercise or drills aimed at linking strength with speed of movement to produce power. Speed-strength is the ability to exert maximum force during high speed movement and also it utilize the force of gravity to store energy in the muscles, this energy is then utilized immediately in an opposite reaction (**Chu, 1998**).

Complex training was developed by Eastern Europeans and explores the physiological reasons behind this exciting new training method. Complex training is a combination of biomechanically similar high intensity resistance training followed by plyometrics exercise performed, set for set on the same day and within the same training session, (e.g.,) performing a

set of squats followed by a set of jump squats. Complex training allows you to generate more force in less time, reducing your workout time but increasing its effectiveness (Chu, 1996).

Speed is a determinant ability in many sports, such as sprinting, soccer, cycling, hockey, fencing, boxing and many other team sports, speed is a major factor that determines the overall outcome. For endurance athlete's speed can mean the ability to win in a spring finish or break away from an opponent in a tactical situation. Training speed, like strength is crucial for athletes of all ages and abilities. Children should be encouraged from a young age to continually strive to find a new ways to develop speed.

Speed is the ability to achieve high velocity. It is a manifestation of explosive force applied to a specific task but is often incorrectly perceived as independent from (or incompatible with) strength. Functional motor skill requiring accelerate as well as declarative speed strength (Bacechle and Earle, 2000).

METHODOLOGY

To achieve the purpose of the present study, Thirty school boys from summer coaching camp which is conducted by Sports Development Authority of Tamilnadu, Thanjavur unit, Tamil Nadu, India, was selected as participants and they were ranged from 16 to 19 years. The selected participants were randomly assigned to one of Three groups of ten each (n=10). The Group I underwent weight training, Group II underwent plyometric training and Group III underwent complex training for duration of 8 week of 24 morning sessions with alternative three days per week in addition to the regular programme in summer coaching camp. The Criterion variable speed and acceleration were selected as a dependent variables and the selected dependent variables were assessed by the standardized test items. Speed was assessed by 50 meters run unit of measurement in seconds acceleration was assessed by 30 meters fly run unit of measurement in seconds. The experimental design selected for this study was pre and post test random group design. The data were collected from each participant before and after the training period and statistically analyzed by using dependent 't' test and analysis of covariance (ANCOVA) was applied to find out significant difference if any between the experimental group .

RESULTS AND DISCUSSIONS**Table – I****PAIRED SAMPLE ‘t’ TEST OF WEIGHT, PLYOMETRIC, AND COMPLEX TRAINING GROUP ON SELECTED DEPENDENT VARIABLES**

Name of training groups	Name of dependent variables	Pre test mean	Post test mean	‘t’
WEIGHT	Speed	7.29	7.15	3.77*
	Acceleration	4.53	4.42	11.00*
PLYOMETRIC	Speed	7.20	7.03	4.02*
	Acceleration	4.43	4.28	9.00*
COMPLEX	Speed	7.24	6.63	14.08*
	Acceleration	4.42	4.02	26.83*

*Significant of 0.05 level

Table value for level of significant df 9 was 2.262

The paired sample ‘t’ was computed on selected dependent variables. The results were presented in the above Table I. All the ‘t’ values are significantly higher than the required table value of df 9 at 0.05 level of confidence was 2.262. The result of the study shows that weight training, plyometric training and complex training group significantly improved the performance of all the selected dependent variables. The results of the study shows that all selected dependent variables speed and acceleration significantly improve the performance due to the 8 week weight training, plyometric training and complex training program.

Speed

Table II Presents the results of the ANCOVA for weight training plyometric training and complex training group on Speed.

Table – II**ANALYSIS OF COVARIANCE COMPUTED FOR WEIGHT TRAINING PLYOMETRIC TRAINING AND COMPLEX TRAINING GROUP FOR SPEED**

Source	SS	df	MS	F
Groups	1.296	2	0.648	41.52*
Error	0.406	26	0.016	

*Significant at 0.05 level of confidence

Table value required for significance at 0.05 level of 2 & 26 was 3.37

One way analysis of covariance (ANCOVA) was computed for Speed. The independent variables included Three training groups, weight training, plyometric training and complex resistance training. The dependent variable was speed and the covariate was an initial performance of the 50 meters run. The ANCOVA 'F' ratio was significant for $df(2, 26) = 41.52$, $p < 0.05$ (See Table II). In order to find out which of the paired means significantly differ scheffe's post hoc test is applied and effect size were present in the Table III for three training groups.

Table – III

SCHEFFE'S POST HOC PAIRED MEANS COMPARISONS AND EFFECT SIZE ON SPEED OF EXPERIMENTAL GROUPS

Group	Adjusted mean	Adjusted mean differences (Effect size are indicated in parentheses)	
		1	2
Weight	7.085	----	
Plyometric	7.070	0.015	----
complex	6.636	0.449* (4.16)	0.434* (3.57)

*Significant at 0.05 level of confidence
Scheffe's C.I value 0.16;

Follow-up was conducted to evaluate pairwise differences among the adjusted means for experimental groups. The results showed that complex training group ($M = 6.636$) had significantly better than the plyometric training group ($M = 7.070$) and weight training group ($M = 7.085$). Plyometric training group and weight training group do not show any significant differences on speed performance. The effect size of those significant adjusted mean differences with complex training group and weight training group, complex training group and plyometric training group were 4.16 and 3.57 respectively.

Acceleration

Table IV Presents the results of the ANCOVA for weight training, plyometric training and complex training group on Acceleration.

Table – IV**ANALYSIS OF COVARIANCE COMPUTED FOR WEIGHT TRAINING PLYOMETRIC TRAINING AND COMPLEX TRAINING GROUP FOR ACCELERATION**

Source	SS	df	MS	F
Groups	0.472	2	0.236	121.82*
Error	0.050	26	0.002	

*Significant at 0.05 level of confidence

Table value required for significance at 0.05 level of 2 & 26 was 3.37

One way analysis of covariance (ANCOVA) was computed for Acceleration. The independent variables included four training groups, namely weight training, plyometric training and complex training. The dependent variable was acceleration and the covariate was an initial performance of the 30 meters fly run. The ANCOVA 'F' ratio was significant for $df(2, 26) = 121.82$, $p < 0.05$ (See Table IV). In order to find out which of the paired means significantly differ scheffe's post hoc test is applied and effect size were present in the Table V for three training groups.

Table –V**SCHEFFE'S POST HOC PAIRED MEANS COMPARISONS AND EFFECT SIZE ON ACCELERATION OF EXPERIMENTAL GROUPS**

Group	Adjusted mean	Adjusted mean differences (Effect size are indicated in parentheses)	
		1	2
Weight	4.358	----	
Plyometric	4.307	0.051	----
complex	4.055	0.303* (5.06)	0.252* (4.00)

*Significant at 0.05 level of confidence Scheffe's C.I value 0.08;

Follow-up was conducted to evaluate pairwise differences among the adjusted means for experimental groups. The results showed that complex training group ($M = 4.055$) had significantly better than the plyometric training group ($M = 4.307$) and weight training group ($M = 4.358$). Plyometric training group and weight training group do not show any significant

differences on acceleration performance. The effect size of those significant adjusted mean differences with complex training group and weight training group, complex training group and plyometric training group were 5.06, and 4.00 respectively.

CONCLUSIONS

From the study the following conclusions were arrived at.

1. There was significant improvement in weight training group, plyometric training group and complex resistance training group participants in speed and acceleration.
2. The experimental groups namely weight training, plyometric training and complex training groups had significant difference towards improving the participants speed and acceleration.
3. Complex training outperformed than plyometric training and weight training on speed and acceleration.

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