



## Comparative effects of Plyometric and Resistance Training on Skill Performance Variables among College Football Players

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### Abstract

*The purpose of the study was to find out the the plyometric training and resistance training on skill performance variables namely kicking and dribbling among college level football players. To achieve the purpose of the present study, forty five football players from Madurai, Tamilnadu were selected as subjects at random and their ages ranged from 18 to 25 years. The subjects were divided into three equal groups of fifteen football players each. The study was formulated as a true random group design, consisting of a pre-test and post-test. The subjects (N=45) were randomly assigned to three equal groups of fifteen football players each. The groups were assigned as plyometric training, resistance training and control group in an equivalent manner. The group I underwent plyometric training, group II underwent resistance training and group III acted as a control group. The two experimental groups were participated the training for a period of twelve weeks to find out the outcome of the training packages and the control group did not participated in any training programme. The variable to be used in the present study was collected from all subjects before they have to treat with the respective treatments. It was assumed as pre-test. After completion of treatment they were tested again as it was in the pre-test on all variables used in the present study. This test was assumed as post-test. Analysis of covariance (ANCOVA) was applied because the subjects were selected random, but the groups were not equated in relation to the factors to be examined. Hence the difference between means of the four groups in the pre-test had to be taken into account during the analysis of the post-test differences between the means. This was achieved by the application of the analysis of covariance, where the final means were adjusted for differences in the initial means, and the adjusted means were tested for significance. When ever the adjusted post-test means were found significant, the scheffe's post-hoc test was administer to find out the paired means difference. To test the obtained results on variables, level of significance 0.05 was chosen and considered as sufficient for the study. The plyometric and resistance training group produced significant improvement in skill performance variables.*

**Keywords:** Plyometric, Resistance, Kicking, Dribbling, Football.

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### Introduction

The competitiveness of athletics has dictated that the athletes become faster, stronger and bigger to keep up with the demands of their sport. Plyometric exercise is one such area that has been shown to increase strength and explosiveness in athletes. Various sports such as football, tennis, golf, soccer, volleyball, running and basketball, as well as others use this as a tool for physical training. Plyometric exercises consist of a rapid eccentric stretch immediately followed by a concentric contraction that stores elastic energy within the muscle and produces more force than a concentric contraction can offer alone. Plyometrics have been verified by research to improve strength, acceleration, power, joint awareness, proprioception and agility (Chu, 1998).

Resistance training is a form of strength training

in which each effort is performed against a specific opposing force generated by resistance. Resistance exercise is used to develop the strength and size of skeletal muscles. Properly performed resistance training can provide significant functional benefits and improvement in overall health and well being. According to the American Sports Medicine Institute (ASMI) is to gradually and progressively overload the musculature system so it gets stronger. Resistance training has been generally categorized into two major types with different objectives: "strength type" and "hypertrophy type". The former consists of high intensity exercises (above 90 % of 1 repetition maximum RM) with low repetitions and long rest periods between sets. This type of regimen is used for gaining strength. On the other hand, the "hypertrophytype" regimen consists of moderate intensity exercises (60 to 75% of 1RM) with higher repetitions and shorter rest periods between sets. This type of regimen has been thought to be effective in gaining muscle size (Kraemer & Fleck, 2005).

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Football, which is also known as Soccer, is probably world's most popular sport, played in practically every nation at varying levels of competence. Football may be played competitively or for fun, as a career, a means of keeping fit or simply a recreational pursuit. Soccer is the most popular sport in the world because it is performed by men and women, children and adults with different levels of expertise. The popularity of the game is reflected in the millions who participate in Soccer in lower levels of play. Soccer is now being played in more than 210 countries throughout the world. Soccer is popular because of the fact it is a simple game requiring very minimum infrastructure and equipment (Reilly, 1996).

### Methodology

The purpose of the study was to determine the effect of plyometric training and resistance training on skill performance variables namely kicking and dribbling among college level football players. To achieve the purpose of the present study, forty five football players from Madurai, Tamilnadu were selected as subjects at random and their ages ranged from 18 to 25 years. The subjects were divided into three equal groups of fifteen football players each. The study was formulated as a true random group design, consisting of a pre-test and post-test. The subjects (N=45) were randomly assigned to three equal groups of fifteen football players each. The groups were assigned as plyometric training, resistance

training and control group in an equivalent manner. The group I underwent plyometric training, group II underwent resistance training and group III acted as a control group. The two experimental groups were participated the training for a period of twelve weeks to find out the outcome of the training packages and the control group did not participated in any training programme. The variable to be used in the present study was collected from all subjects before they have to treat with the respective treatments. It was assumed as pre-test. After completion of treatment they were tested again as it was in the pre-test on all variables used in the present study. This test was assumed as post-test. Analysis of covariance (ANCOVA) was applied because the subjects were selected random, but the groups were not equated in relation to the factors to be examined. Hence the difference between means of the three groups in the pre-test had to be taken into account during the analysis of the post-test differences between the means. This was achieved by the application of the analysis of covariance, where the final means were adjusted for differences in the initial means, and the adjusted means were tested for significance. When ever the adjusted post-test means were found significant, the scheffe's post-hoc test was administer to find out the paired means difference. To test the obtained results on variables, level of significance 0.05 was chosen and considered as sufficient for the study.

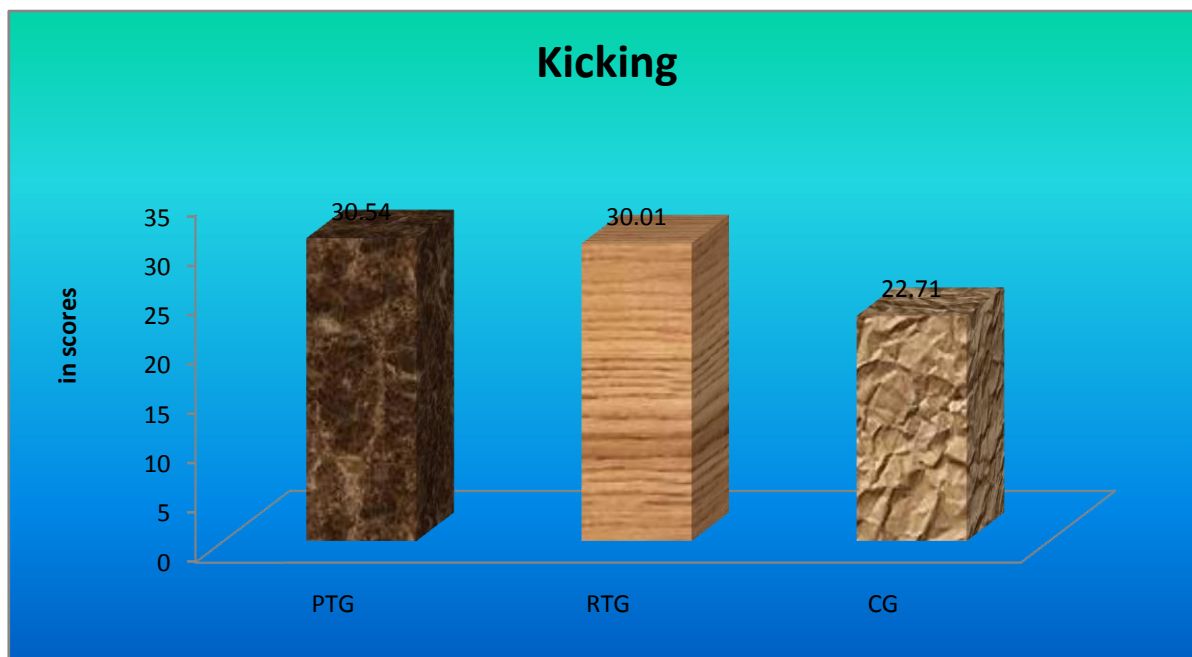
### Results

**Table I.** Computation of Analysis of Covariance of Mean of Plyometric Training, Resistance Training and Control Groups on Kicking (PTG, RTG & CG)

	PTG	RTG	CG	Source of Variance	Sum of Squares	Df	Means Squares	F-ratio
<b>Pre-Test Means</b>	23.13	23.20	22.06	<b>BG</b>	12.13	2	6.06	1.11
				<b>WG</b>	229.06	42	5.45	
<b>Post-Test Means</b>	30.53	30.00	22.73	<b>BG</b>	569.64	2	284.82	82.69*
				<b>WG</b>	144.66	42	3.44	
<b>Adjusted Post-Test Means</b>	30.54	30.01	22.71	<b>BG</b>	546.02	2	273.01	77.48*
				<b>WG</b>	144.46	41	3.52	

Table I reveals that the indicated that the obtained 'F'-ratio for the pre-test means among the groups on kicking were 23.13 for experimental group – I, 23.20 for experimental group – II and 22.06 for control group. The obtained 'F'-ratio 1.11 was lesser than the table 'F'-ratio 3.21. Hence the pre-test mean 'F'-ratio was insignificant at 0.05 level of confidence for the degree of freedom 2 and 42. The post-test means were 30.53 for experimental group – I, 30.00 for experimental group – II and 22.73 for control group. The obtained 'F'-ratio 82.69 was higher than the table 'F'-ratio 3.21. Hence the post-test mean 'F'-ratio was significant at 0.05

level of confidence for the degree of freedom 2 and 42. The adjusted post-test means were 30.54 for experimental group – I, 30.01 experimental group – II and 22.71 for control group. The obtained 'F'-ratio 77.48 was higher than the table 'F'-ratio 3.22. Hence the adjusted post-test mean 'F'-ratio was significant at 0.05 level of confidence for the degree of freedom 2 and 41. It was concluded that there was a significant mean difference among plyometric training group, resistance training group and control group, in developing kicking of the football players.

**Figure I.** Adjusted Post Test Differences of the Plyometric Training, Resistance Training and Control Groups on Kicking (PTG, RTG & CG)**Table II.** The Scheffe's Test for the Differences between the Adjusted Post Test Means on Kicking

Adjusted Post-test means			Mean Difference	Required CI
Plyometric Training	Resistance Training	Control Group		
30.54	30.01	---	0.53	1.73
30.54	---	22.71	7.83*	
---	30.01	22.71	7.30*	

\* Significant at 0.05 level of confidence

Table II shows the post hoc analysis obtained on adjusted post test means. The mean difference required for the confidential interval to be significant was 1.73. It was observed that the plyometric training

group significantly improved kicking better than the control group. The resistance training group significantly improved kicking better than the control group.

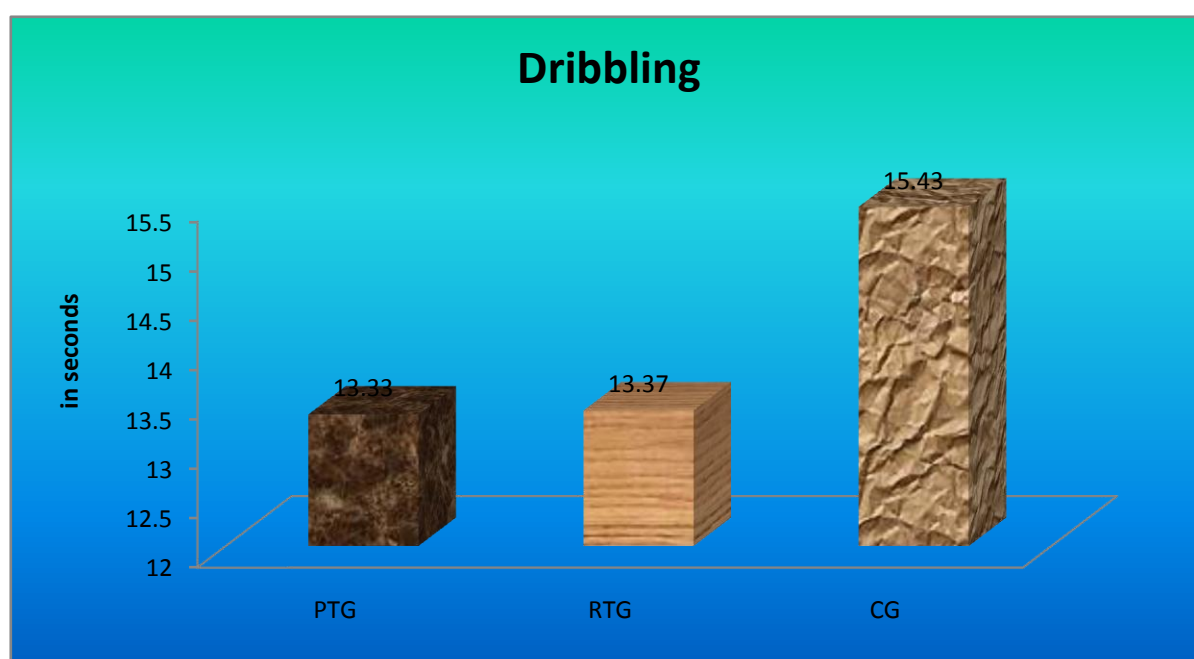
**Table III.** Computation of Analysis of Covariance of Mean of Plyometric Training, Resistance Training and Control Groups on Dribbling (PTG, RTG & CG)

	PTG	RTG	CG	Source of Variance	Sum of Squares	Df	Means Squares	F-ratio
Pre-Test Means	15.31	15.35	15.49	BG	0.26	2	0.13	0.93
				WG	5.91	42	0.14	
Post-Test Means	13.30	13.36	15.47	BG	45.65	2	22.82	146.76*
				WG	6.53	42	0.15	
Adjusted Post-Test Means	13.33	13.37	15.43	BG	41.70	2	20.85	144.45*
				WG	5.91	41	0.14	

Table III reveals that the indicated that the obtained 'F'-ratio for the pre-test means among the groups on dribbling were 15.31 for experimental group – I, 15.35 for experimental group – II and 15.49 for control group. The obtained 'F'-ratio 0.93 was lesser than the table 'F'-ratio 3.21. Hence the pre-test mean 'F'-ratio was insignificant at 0.05 level of confidence for the degree of freedom 2 and 42. The post-test means were 13.30 for experimental group – I, 13.36 for experimental group – II and 15.47 for control group. The obtained 'F'-ratio 146.76 was higher than the table 'F'-ratio 3.21. Hence the post-test mean 'F'-ratio was significant at 0.05

level of confidence for the degree of freedom 2 and 42. The adjusted post-test means were 13.33 for experimental group – I, 13.37 experimental group – II and 15.43 for control group. The obtained 'F'-ratio 144.45 was higher than the table 'F'-ratio 3.22. Hence the adjusted post-test mean 'F'-ratio was significant at 0.05 level of confidence for the degree of freedom 2 and 41. It was concluded that there was a significant mean difference among plyometric training group, resistance training group and control group, in developing dribbling of the football players.

**Figure II.** Adjusted Post Test Differences of the Plyometric Training, Resistance Training and Control Groups on Dribbling (PTG, RTG & CG)



**Table IV.** The Scheffe's Test for the Differences between the Adjusted Post Test Means on Dribbling

Adjusted Post-test means			Mean Difference	Required CI
Plyometric Training	Resistance Training	Control Group		
13.33	13.37	---	0.04	0.34
13.33	---	15.43	2.10*	
---	13.37	15.43	2.06*	

\* Significant at 0.05 level of confidence

Table IV shows the post hoc analysis obtained on adjusted post test means. The mean difference required for the confidential interval to be significant was 0.34. It was observed that the plyometric training group significantly improved dribbling better than the control group. The resistance training group significantly improved dribbling better than the control group.

## Results

1. The plyometric training group produced significant improvement in and skill performance

variables. The 't' values of the selected variables have reached the significant level.

2. The resistance training group produced significant improvement in skill performance variables. The 't' values of the selected variables have reached the significant level.
3. In the control group the obtained 't' value on all the variables were failed to reach the significant level.

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