



## Influence of Plyometric Training Resistance Training and Combined Training with Skill Practices on Playing Ability among Soccer Players

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### Abstract

The purpose of the study was to find out the influence of plyometric training resistance training and combined training with skill practices on playing ability among soccer players. To achieve the purpose of the study, eighty college men soccer players who participated in the intramural tournament during the academic year 2013 – 2014 were randomly selected as subjects from Meenakshi College of Engineering, Chennai. The age of the subjects ranged from 18 to 24 years. The subjects were attached at random to one of the four groups in which group I (N=20) underwent plyometric training with soccer skill practices, group II (N=20) underwent resistance training with soccer skill practices, group III (N=20) underwent combined training with soccer skill practices, and group IV (N=20) acted as control group. The subjects were free to withdraw their consent in case they felt any discomfort during the period of training. However there were no dropouts in the study. A qualified physician examined the subjects medically and declared that they were fit to participate in the training programme for the study. The selected subjects' age, height and weight ranged from 18 years 6 months to 24 years 3 months, 148cms to 165cms and 49 kgs to 66 kgs respectively. The subjects in all the four groups were tested on selected criterion variables such as dribbling, shooting and passing were assessed by mor-christian soccer ability test prior to (pre test) twelve weeks (post test) of training except those of control group who did not participate in any special training. As the experimental design is random group design and the groups are not equated, ANCOVA was applied where the final means were adjusted for differences in the initial means. Scheffe's post hoc test was administered to find out significant difference, if any, between paired means. To find out the influences of plyometric, resistance and combined training on the selected playing ability variables, the collected data were analysed with ANCOVA and scheffe's post hoc test. It was also observed that there were significant statistical differences between the pre and post test scores in playing ability variables among plyometric resistance and combined training groups on soccer players. It was observed that the combined training (plyometric and resistance) had shown greater influence in all the dependent variables than plyometric training and resistance training with skill practices in that order.

**Keywords:** Plyometric, Resistance, Soccer, Skill.

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### Introduction

Association football, commonly known as football or soccer, is a sport played between two teams of eleven players with a spherical ball. It is played by 250 million players in over 200 countries, making it the world's most popular sport. (Allen, 1993) The game is played on a rectangular field with a goal at each end. The object of the game is to score by using any part of the body besides the arms and hands to get the football into the opposing goal. The goalkeepers are the only players allowed to touch the ball with their hands or arms while it is in play and then only in their penalty area. Outfield players mostly use their feet to strike or pass the ball, but may use their head or torso to strike the ball instead. The

team that scores the most goals by the end of the match wins. If the score is tied at the end of the game, either a draw is declared or the game goes into extra time and or a penalty shootout depending on the format of the competition. The Laws of the Game were originally codified in England by The Football Association in 1863. Association football is governed internationally by the International Federation of Association Football (FIFA; French: Fédération Internationale de Football Association) which organises a World Cup every four years (Dunning, 1999).

Plyometrics refers to exercises that enable a muscle to reach maximal strength in as short a time as possible. Such exercises usually involve some form of jumping, but other modes of exercise exist. The elements ply and metric come from Latin roots for 'increase' and 'measure', 'respectively; the combination thus means "measurable increase". Plyometric exercises utilize the force of gravity (e.g., you step off a box) to store energy

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in the muscles (potential energy). This energy is then utilized immediately in an opposite reaction (e.g., you immediately jump up, up on landing), so the natural elastic properties of the muscle will produce kinetic energy. Elastic strength is the ability of muscle and connective tissues (muscle sheath and tensions tissues) to rapidly exert a force in order to produce maximal power in linear, vertical, lateral or combination movements. Plyometric exercises are especially useful in sport that requires speed-strength. Speed strength is the ability to exert maximal force during high-speed movements. Sports that require speed-strength include track – and-field jumping, throwing and sprinting; volley ball, basketball, football, baseball, and diving (Which require maximal jumping ability); blocking and tackling in football; and rockets sports, base ball and softball. ( Which requires swinging movements).

A resistance workout is made up of several different types of exercises. These are mostly performed on exercise machines that are specifically designed for building certain muscle groups. A typical workout lasts for about half an hour, and you can do just one or several sets of each exercise. In one set of exercise, you can do 8 to 15 repetitions. If you want to see growth in muscle strength and mass within a shorter time, it is recommended that you perform two or three workouts every week. You will see the most improvement in the first few months of training. There are basically three different ways to do resistance exercises, and they are weight machines, free weights and calisthenics. When you are using weight machines, you can choose the weight you want to lift by adding or removing plates, but your movements will be dictated by the machines you use. On the other hand, free weights allow you to determine and control the position of your body when you are lifting weights. Calisthenics are performed without the use of weights, and they include exercises such as pushups, sit ups and chin ups. In these exercises, your body weight acts as the resistance force.

## Results

**Table I.** Summary of analysis of variance for the initial means on selected variables of plyometric training, resistance training, combined training and control groups

Group	Source of Variance	Sum of Squares	df	Mean Squares	Obtained 'F'-ratio
Shooting	BS	32.950	3	10.983	1.229
	WS	679.000	76	8.934	
Dribbling	BS	0.062	3	0.021	0.757
	WS	2.069	76	0.027	
Passing	BS	0.438	3	0.146	0.274
	WS	40.450	76	0.532	

\* Not Significant at 0.05 level

Table value for df 3 and 76 is 2.72

## Methodology

The purpose of the study was to find out the influence of plyometric training resistance training and combined training with skill practices on playing ability among soccer players. To achieve the purpose of the study, eighty college men soccer players who participated in the intramural tournament during the academic year 2013 – 2014 were randomly selected as subjects from Meenakshi College of Engineering, Chennai. The age of the subjects ranged from 18 to 24 years. The subjects were attached at random to one of the four groups in which group I (N=20) underwent plyometric training with soccer skill practices, group II (N=20) underwent resistance training with soccer skill practices, group III (N=20) underwent combined training with soccer skill practices, and group IV (N=20) acted as control group. The subjects were free to withdraw their consent in case they felt any discomfort during the period of training. However there were no dropouts in the study. A qualified physician examined the subjects medically and declared that they were fit to participate in the training programme for the study. The selected subjects' age, height and weight ranged from 18 years 6 months to 24 years 3 months, 148cms to 165cms and 49 kgs to 66 kgs respectively. The subjects in all the four groups were tested on selected criterion variables such as dribbling, shooting and passing were assessed by mor-christian soccer ability test prior to (pre test) twelve weeks (post test) of training except those of control group who did not participate in any special training. As the experimental design is random group design and the groups are not equated, ANCOVA was applied where the final means were adjusted for differences in the initial means. Scheffe's post hoc test was administered to find out significant difference, if any, between paired means. To find out the influences of plyometric, resistance and combined training on the selected playing ability variables, the collected data were analysed with ANCOVA and scheffe's post hoc test.

The F-value obtained from testing the initial means among the four groups on the criterion measures were shown in Table I. The corresponding 'F' values needed for significance at 0.05 level of confidence was 2.72. The calculated 'F' values are: for Shooting (1.229), Dribbling (0.757) and Passing (0.274). Since the

observed F-values of these were found lesser than the required table value of 2.72 at 0.05 level of confidence, the observed mean differences among the groups on criterion measures were statistically not significant. Thus the obtained results confirm that the random assignment of subjects to four groups was successful.

**Table II.** Summary of analysis of variance for the final means on selected variables of plyometric, resistance and combined (plyometric and resistance) and control groups

Group	Source of Variance	Sum of Squares	df	Mean Squares	Obtained 'F'-ratio
Shooting	BS	29502.450	3	9834.150	1267.846*
	WS	589.500	76	7.757	
Dribbling	BS	37.309	3	12.436	1103.332*
	WS	0.857	76	0.011	
Passing	BS	264.738	3	88.246	122.496*
	WS	54.750	76	0.720	

\* Significant at 0.05 level

Table value for df 3 and 76 is 2.72

The F-value obtained from testing the initial means among the three groups on the criterion measures were shown in Table II. The corresponding 'F' values needed for significance at 0.05 level of confidence was 2.72. The calculated 'F' values are: Shooting (1267.846),

Dribbling (1103.332) and Passing (122.496). Since the observed F-values of these were found greater than the required table value of 2.72 at 0.05 level of confidence, the observed mean differences among the groups on criterion measures were statistically significant.

**Table III.** Summary of analysis of covariance for the adjusted means on selected variables of plyometric, resistance, combined (plyometric and resistance) and control groups

Group	Source of Variance	Sum of Squares	df	Mean Squares	Obtained 'F'-ratio
Shooting	BS	29501.394	3	9833.798	1258.454*
	WS	586.064	75	7.814	
Dribbling	BS	37.281	3	12.427	1090.920*
	WS	.854	75	0.011	
Passing	BS	264.796	3	88.265	122.104*
	WS	54.215	75	0.723	

\* Significant at 0.05 level

Table value for df 3 and 75 was 2.72

The F-value obtained from testing the initial means among the three groups on the criterion measures were shown in Table III, the corresponding 'F' values needed for significance at 0.05 level of confidence was 2.72. The calculated 'F' values are Shooting (1258.454), Dribbling (1090.920) and Passing (122.104). Since the observed F-values of these were found greater than the required table value of 2.72 at 0.05 level of confidence, the observed mean difference among the groups on

criterion measures was statistically significant. It is evident that the criterion measures are influenced by interventions used in the study. Since the observed mean difference among the four groups was statistically significant, in order to find out which of the pairs of groups grown up for the significant difference, the Scheffe post-hoc test was applied. The results of the same are given in Table –IV.

**Table IV.** Scheffe’s test of significance between paired final adjusted means for playing ability

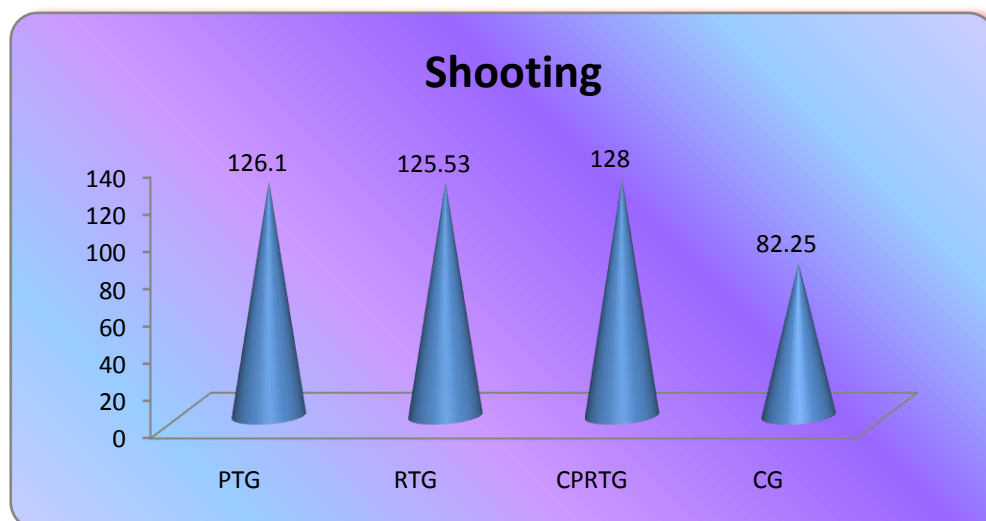
Sl.No	Performance Variables	Adjusted Means				Mean Differences	CI Value
		RTG	PTG	CRPTG	CG		
1	Shooting	126.10	125.53	---	---	0.57	2.52
		126.10	---	128.00	---	1.90	
		126.10	---	---	82.25	43.85*	
		---	125.53	128.00	---	2.47	
		---	125.53	---	82.25	43.28*	
		---	---	128.00	82.25	45.75*	
2	Dribbling	17.92	17.94	---	---	0.02	0.09
		17.92	---	17.91	---	0.01	
		17.92	---	---	19.50	1.58*	
		---	17.94	17.91	---	0.03	
		---	17.94	---	19.50	1.56*	
		---	---	17.91	19.50	1.59*	
3	Passing	10.00	10.11	---	---	0.11	0.76
		10.00	---	10.44	---	0.44	
		10.00	---	---	5.98	4.02*	
		---	10.11	10.44	---	0.33	
		---	10.11	---	5.98	4.13*	
		---	---	10.44	5.98	4.46*	

\*significant at 0.05 level

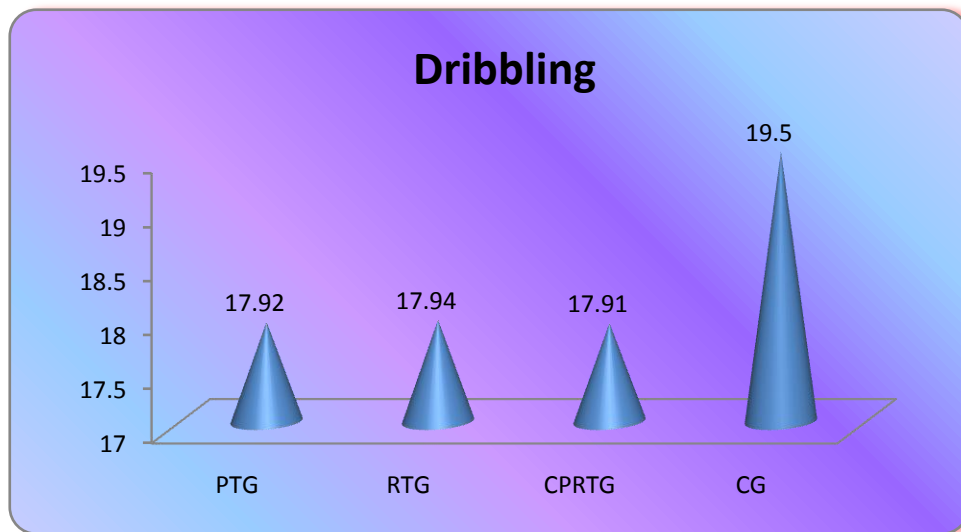
The mean differences for shooting between PTG and CG, RTG and CG, CRPTG and CG were 43.85, 43.28 and 45.75 respectively was greater than the CI value 2.52. Hence, there exists significant differences between the groups. In case of mean difference between PTG and RTG, PTG and CPRTG, RTG and CPRTG were 0.57, 1.90 and 2.47 respectively were lesser than the CI value 2.52 and exists insignificant differences. The mean differences for dribbling between PTG and CG, RTG and CG, CRPTG and CG were 1.58, 1.56 and 1.59 respectively which was greater than the CI value 0.09. Hence, there exists significant difference between the groups. In case of mean difference between PTG and RTG, PTG and CPRTG, RTG and CPRTG which were

0.02, 0.01 and 0.03 respectively were lesser than the CI value 0.09 and there exists insignificant differences. The mean difference for passing between PTG and CG, RTG and CG, CRPTG and CG were 4.02, 4.13 and 4.46 respectively which was greater than the CI value 0.76. Hence, there exists significant differences between the groups. In case of mean differences between PTG and RTG, PTG and CPRTG, RTG and CPRTG which were 0.11, 0.44 and 0.33 respectively were lesser than the CI value 0.76 and there exists insignificant differences. The graphical representations for playing ability are presented in the figure I to III.

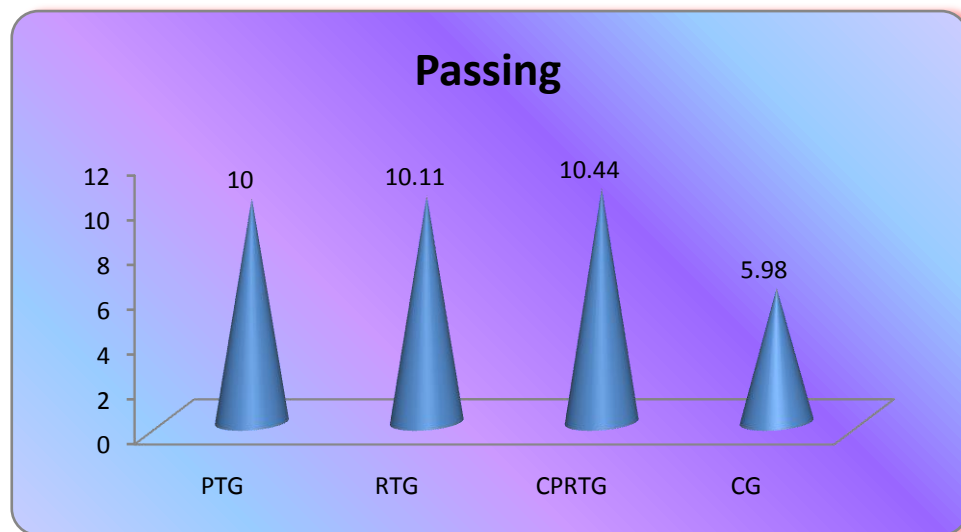
**Figure I.** Graph showing the adjusted mean values of all the groups on shooting



**Figure II.** Graph showing the adjusted mean values of all the groups on dribbling



**Figure III.** Graph showing the adjusted mean values of all the groups on passing



**Conclusion**

Based on the finding of the study, the following conclusions were drawn

1. It was also observed that there were significant statistical differences between the pre and post test scores in playing ability variables among plyometric resistance and combined training groups on soccer players.
2. It was observed that the combined training (plyometric and resistance) had shown greater influence in all the dependent variables than plyometric training and resistance training with skill practices in that order.

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