



# THE INFLUENCE OF PLYOMETRIC TRAINING WITH CORE TRAINING ON SELECTED MOTOR FITNESS, PARAMETERS OF MEN VOLLEYBALL PLAYERS.

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## ABSTRACT

The research study was prepared on random group design involving N=60 sixty men inter collegiate level participated Volley ball players. The Volley ball players were chosen for the study were divided into four equal groups of n=15 fifteen volley ball players each at random and designated as empirical group 'A' trained with plyometric training (PTG = I), empirical group 'B' trained with core training (CTG = II), empirical group 'C' trained with combined training of plyometric training with core training (CPCTG = IV) and control group volley ball players 'D' (CG = IV) did not participate any of the above training programme apart from their regular training programme. The treatment of plyometric training, core training and combined training to the specific groups volley ball players were given three days per week on alternative days for a period of 12 weeks. The collected scores were treated with [ANCOVA] Analysis of Covariance was used to calculate 'F' ratio to find the significant changes among all the four groups. Whenever the adjusted post test means 'F' ratio found significant the Scheffe's post hoc test was applied to find the paired means difference to compare with critical value. All the collected scores were analyzed with computer SPSS statistical packages. The level of significance was fixed at 0.05 level of confidence.

**Key Words:-** Plyometric training, Core training, Volley ball players.

## INTRODUCTION

A study of the individual reveals four general directions or phases in which growth and development take place, namely; physical development, motor development, and human relations development. Physical education plays an important part in contributing to each of these phases of human growth and development. The physical development objective deals with the programme of activities which builds physical power in an individual through the development of the various organic systems of the body. It results in the ability to sustain adaptive effort, the ability to recover, and the ability to resist fatigue. The value of this objective is based on the fact that an individual will be more active, have better performance, and be healthier, if the systems of the body are adequately developed and functioned properly.

### **Plyometric Training**

The success in many sports and games, players' depends on explosive power. The players must be able to use the muscular strength during game as quickly and forcefully as possible. These form of activities can train the players in the form of speed-strength exercises (Yessis and Hatfield 1986) sports performances depend on power. An increase in muscles power athletes gives best performance whereas power mean amount of work a muscle can produce per unit of time (Paul, et al., 2003). Several research studies results proved that plyometric exercises significantly increase the explosive power (Adams, et al., 1992 & Ioannis, et. al., 2000).

#### Importance of plyometric exercises for volleyball players

- It improves the jumping skills of volleyball players for better shots and block opponents shots.
- It improves the quickness of volleyball players to move from side to side and front to back.
- It increases the speed of the volleyball players through strength.
- Quick change of direction ability of volleyball players from the upward motion of a vertical jump to the down ward motion of a point-saving dig.

## Core Training

The serve is a fundamental aspect of volleyball (Monge, 2007). The speed of hitting the volleyball with hands' determine by the execution of movements of a kinetic chain, which involves wrist, elbow, shoulder, trunk and hips (Gutierrez et al., 1994), muscles coordination during execution of kinetic chain performance (Masumura, et. al., 2009). Core training is a major element of training plans (Riewald, 2003). Core exercises performed with own body weight to increase the muscular strength of lumbo pelvic muscles and deep muscles to keep the spine balance during execution of movements (Atans 2013). Motor skill can be enhanced with physical core training. Core training is preferred in your training schedule because the core exercises can be done in the field without any equipment and contributes muscular strength and endurance development with in short time. Axel, (2013) Core region anatomically, the whole muscles involve in the active movements and stability of the body connected with the skeletal system of the trunk region.

## Motor Fitness

Volleyball is a game in which players are performing numerous actions for successful action. Volleyball players' bio motor abilities required muscular strength, muscular endurance, agility, flexibility, quickness, repeated sprint capacity and high aerobic capacity for successful action in volleyball game (Forthomme et al., 2005). Team sports require sudden movement, quick and fast reaction. Volleyball players has to be fit physically and psychologically, as the matches take several hours to complete and there is no time limit for matches (Sandhu 1989). To prepare successful volleyball players, coaches need to develop player's reaction time, quickness in visual perception and high degree of accuracy. The volleyball standard tests to measure the players such as Russell-Lange Volleyball test, French-cooper Volleyball Test, AAHPER Volleyball Test etc, Russell-Lange Volleyball test is found most effective test to measure the serving ability and volleying ability of the volleyball players.

## Volley ball

It is a ball game that consists of two teams in which a ball is hit over the net, the aim is to score points by making the ball to reach opponent's court. Volley ball has six basic skills', serve, dig, pass, set,

spike and block. Serve: - It is the attempt to drive the ball into the opponent court. There are two types of serves under hand serve and over hand serve. Under hand serve: first the player need to hold the ball with their non dominated hand, drop the ball slightly and finally hit the ball with dominated hand. Over hand serve: first hold the ball with non dominated hand than toss the ball 2-3 feet in front of the body and then hit it with the strong and hard surface of the dominated hand. Pass: - the ability to prevent the ball from touching one court by dumping or passing the ball. First the players need to bend their knees for ready position, the player also needs to make their forefingers perpendicular and thumbs are parallel to each other. Lastly when the ball is coming, the player needs to make sure that their arms are straight and hit the ball either by wrist and arms. Dig: - the attempts by a team to properly handle the opponent serve or any form of attack. Almost same as pass because it is both an attempt to receive the ball properly, by unlike in pass, in a dig player can use different parts of the bodies such as hands, feet, arms and sometimes legs just to save the ball. Set: - a tactical skill in which a ball is directed to a point where a player can spike it in the opponent court. First a player need to make sure that their hand can accommodate the shape of the ball then set or toss the ball above the head by pushing the ball and extending their arms. Spike:- the act of scoring the ball over the net into the opposing court effectively and aggressively. First the dominate foot should take the first step and then follow the non dominated foot for example right-left foot step then first right –left foot steps then jump and hit the ball. Block: - an action taken by player by standing or jumping at the front of the net to top or alter an opponent attack. First player be in a ready position, bend knees and elbows, and hands are raise in front of the face. The blocker should be alert and ready to run left or right the moment the setter set the ball to the spikier. The blocker need to jump straight with extended arms and spread finger.

### **Statement of the problem**

The main purpose of this study is to investigate the influence of Plyometric training with core training on selected bio motor fitness, **Muscular Strength** parameters of men volleyball players.

### **METHODOLOGY**

The investigator describes the details regarding methodology adopted for selection of men volleyball players, experimental designed are adopted, selection of independent and dependent parameter motor fitness, variable **Muscular Strength** Selected parameters of motor fitness, variables, test and unit of

measurements, orientation of volley ball players, competency of the investigator, instrument reliability used in this study, Inter class co-efficient of correlation values on selected criterion parameters, pilot study, collection of data, training schedule, administration of test and statistical analysis of data had been explained in the methodology .

### **Selection of Men Volleyball Players**

To achieve the main purpose of the research study total sixty men intercollegiate level participated volley ball players were chosen randomly from Rajiv Gandhi University of Knowledge Technologies Nuzvid, Krishna district, of Andhra Pradesh from these only N=60 volleyball players selected randomly. The age of the selected men volleyball players were ranged from 18 to 25 years as per college record [Mean average Age 21.14, height 168.12 and weight 66.18]. The empirical treatment assigned such as plyometric training, core training and combined plyometric training with core training for twelve weeks.

### **Adopted Experimental Design:**

The research study was prepared on random group design involving N=60 sixty men inter collegiate level participated Volley ball players. The Volley ball players were chosen for the study were divided into four equal groups of n=15 fifteen volley ball players each at random and designated as empirical group 'A' trained with plyometric training (PTG = I), empirical group 'B' trained with core training (CTG = II), empirical group 'C' trained with combined training of plyometric training with core training (CPCTG = IV) and control group volley ball players 'D' (CG = IV) did not participate any of the above training programme apart from their regular training programme. The treatment of plyometric training, core training and combined training to the specific groups volley ball players were given three days per week on alternative days for a period of 12 weeks. The scores of selected motor fitness, parameters were obtained before the start of empirical periods (pre-test score) and after the 12 weeks of the empirical period (post-test score).

**RESULTS -Table 1**

**RESULTS OF ANCOVA ON EFFECT OF PLYOMETRIC TRAINING [PTG] CORE TRAINING [CTG] AND COMBINED TRAINING OF PLYOMETRIC AND CORE TRAINING [CPCTG] COMPARED WITH CONTROL GROUP [CG] VOLLEY BALL PLAYERS ON MUSCULAR STRENGTH**

TEST	PT GROU P	CT GROU P	CPCT GROU P	C GROU P	SOURCE OF VARIANCE	SUM OF SQUARES	df	MEAN SQUARES	OBTAINED F
Pre Test Mean SD	21.86 3.15	21.80 2.75	21.26 3.59	22.13 3.20	Between	5.93	3	1.97	0.194
					Within	570.80	56	10.19	
Post Test Mean SD	27.80 2.98	24.26 2.37	29.20 3.09	20.33 2.41	Between	7.7.33	3	235.77	31.50
					Within	419.06	56	7.48	
Adjusted Post Test Mean	27.72	24.24	29.58	20.05	Between	786.05	3	262.01	161.59
					Within	89.18	55	1.62	
Mean Diff	5.94	2.46	7.94	1.80	-	-	-	-	-

*PTG: Plyometric training group Volleyball players; CTG: Core training group Volleyball players; CPCTG: Combined plyometric and core training group Volleyball players; CG: Control group Volleyball players*

*\*Significant*

*Required table F-ratio at 0.05 level of confidence for 3 and 56 (df) =2.77, 3 and 55 (df) =2.77.*

The above table-1 shows the prior scores means values on muscular strength of the Plyometric training group volley ball players [PTG], core training group Volley ball players [CTG], combined plyometric and core training group volley ball players [CPCTG] and control volley ball players group [CG] are 21.86, 21.80, 21.26 and 22.13 respectively. The calculated 'F' value for prior scores means was 0.194, lesser than the tabular value 2.77 for 3 and 56 (df) at 0.05 level of confidence. This result on prior score reveals that there are no statistically significant changes between three empirical groups volley players PTG, CTG, CPCTG and CG control group volley ball players on muscular strength.

The post scores mean values on muscular strength of the Plyometric training group volley ball players [PTG], core training group Volley ball players [CTG], combined plyometric and core training group volley ball players [CPCTG] and control volley ball players group [CG] are 27.80, 24.26, 29.20 and 20.33 respectively. The calculated 'F' value for post scores means was 31.50, higher than the tabular value 2.77 for 3 and 56 (df) at 0.05 level of confidence. This result on post score proved that there is statistically significant changes between three empirical groups volleyball players PTG, CTG, CPCTG and CG control group volleyball players on muscular strength.

The adjusted post test mean values on muscular strength of the Plyometric training group volley ball players [PTG], core training group Volley ball players [CTG], combined plyometric and core training group volley ball players [CPCTG] and control volley ball players group [CG] are 27.72, 24.24, 29.58 and 20.05 respectively. The calculated 'F' value for adjusted post test means was 42.56, greater than the tabular value 2.77 for 3 and 55 (df) at 0.05 level of confidence. This result on adjusted post test declared that there is statistically significant changes between three empirical groups volleyball players namely PTG, CTG, CPCTG and CG control group volley ball players on muscular strength.

Table -2

**MULTIPLE COMPARISONS OF PAIRED ADJUSTED MEANS OF PTG, CTG, CPCTG AND CG  
GROUPS VOLLEY BALL PLAYERS AND SCHEFFE'S CONFIDENCE INTERVAL TEST  
RESULTS ON  
MUSCULAR STRENGTH**

ADJUSTED POSTTEST MEANS VALUES					Required . C I
PT GROUP	CT GROUP	CPCT GROUP	C GROUP	MEAN DIFFERENCE	
27.72	24.24	-	-	3.48*	1.33
27.72	-	29.58	-	1.86*	1.33
27.72	-	-	20.05	7.67*	1.33
-	24.24	29.58	-	5.34*	1.33
-	24.24	-	20.05	4.19*	1.33
-	-	29.58	20.05	9.53*	1.33

*PTG: Plyometric training group Volleyball players; CTG: Core training group Volleyball players; CPCTG: Combined plyometric and core training group Volleyball players; CG: Control group Volleyball players*

*\* Significant*

*The table -2 display the paired mean differences on muscular strength of four groups volley ball players namely plyometric training group volley ball players [PTG], core training group volley ball players [CTG], combined plyometric and core training group volley ball players [CPCTG] and control group volley ball players [CG].*

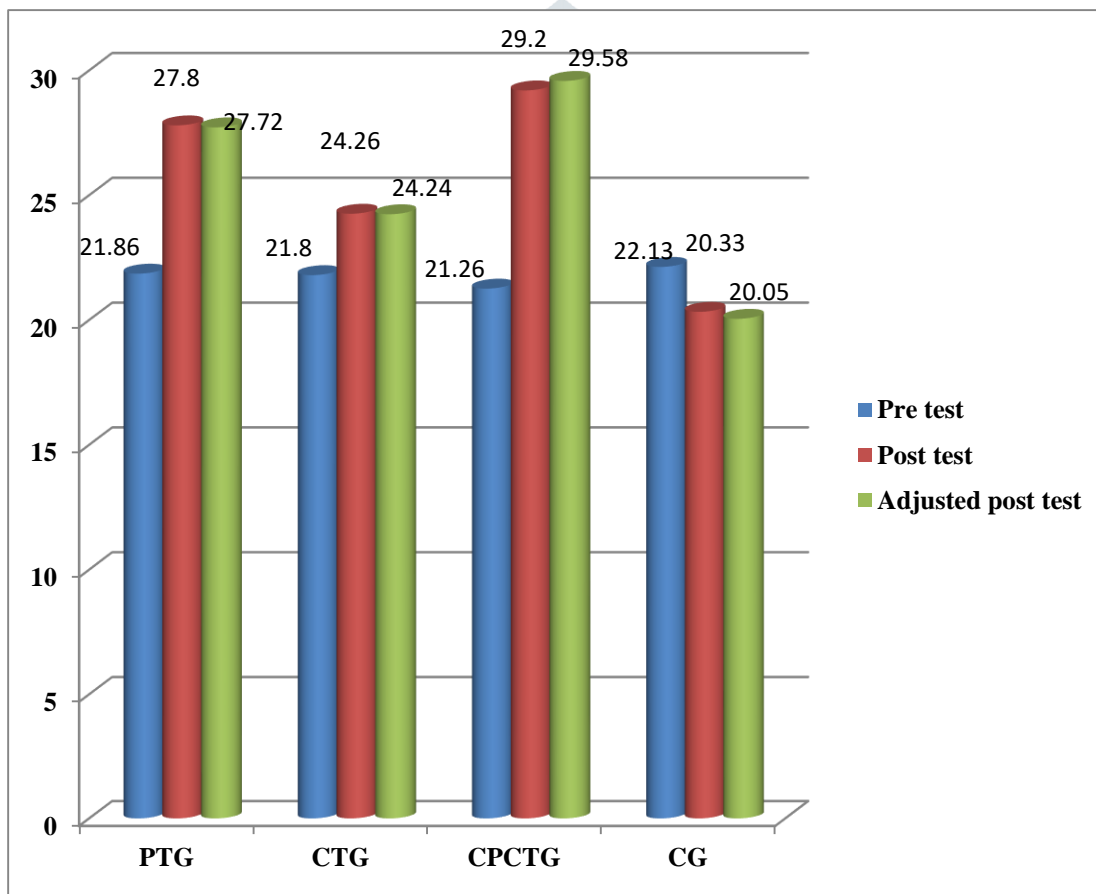
The paired mean differences between plyometric training group volley ball players [PTG] and core training group volley ball players [CTG], plyometric training group volley ball players [PTG] and combined plyometric and core training group volley ball players [CPCTG], plyometric training group volley ball players [PTG] and control volley ball players group [CG], core training group volley ball players [CTG] and combined plyometric and core training group volley ball players [CPCTG], core training group volley ball players [CTG] and control volley ball players group [CG] and combined plyometric and core training group volley ball players [CPCTG] and control volley ball players group [CG] were 3.48, 1.86, 7.67, 5.34, 4.19 and



9.53 higher than CI value of 1.33. So above table confirmed that there are significant differences exist between four groups on muscular strength.

FIGURE - 1

**CLUSTERED CYLINDER GRAPHICAL PRESENTATION OF PRE TEST SCORE MEAN, POST TEST SCORE MEAN AND ADJUSTED POST SCORE MEAN OF PTG, CTG, CPCTG AND CG VOLLEY BALL PLAYERS ON MUSCULAR STRENGTH**



*PTG: Plyometric training group Volleyball players; CTG: Core training group Volleyball players; CPCTG: Combined Plyometric and core training group Volleyball players; CG: Control group Volleyball players*

## Discussion on Hypotheses

The investigator on the bases of statistical analysis acceptance and rejection of hypotheses had been made.

1. The research hypothesized that there would be significant enhancement due to the influence of plyometric training, core training and combined plyometric training with core training on selected motor fitness parameters namely muscular strength, for men volleyball players. The statistical analysis report confirmed that all the selected motor fitness parameters namely speed, agility, flexibility, explosive power, muscular strength, muscular endurance and balance of plyometric training group volley ball players, core training group volley players and combined plyometric and core training group volley ball players significantly improved with their respective training. So research first hypotheses accepted and null hypotheses rejected.

## Discussion on Finding of the Results - Motor Fitness Variables -- Muscular Strength

The three empirical group's volleyball player's muscular strength increased as number of pull ups count increased with the treatment of explosive strength exercises [Plyometric], core exercises, combined explosive strength exercises [plyometric] and core exercises. The result of muscular strength link with the various research articles were Ramin et al., (2014) research finding shows average of muscular strength was significantly increased with the help of six weeks plyometric training and resistance training of volleyball players. Abdurrahman and Murat (2018) result showed that 10-weeks of quad-core training develop positively the core muscles strength and endurance which contribute to the development of basic motor skills. McKinlay et al., (2018) reported that eight weeks of plyometric training and free weight resistance training resulted significant increased in muscular strength. Rahman and Naser (2005) proved that weight training, plyometric training and plyometric-weight training significantly improved muscular strength.

## Conclusions

The conclusions are drawn on selected motor fitness, physiological and volley ball skill related performance variables on the bases of statistical analyses report are given below;

### Motor Fitness Variables: Muscular Strength – Pull ups

The statistical result on muscular strength – pull ups performance concluded that plyometric training group volley ball players [PTG], core training group volley ball players [CTG], combined plyometric and core training group volley ball players [CPCTG] significantly had more muscular strength to take more pull ups comparative to control volley ball players group [CG]. The study further proved that plyometric training group volley ball players [PTG] had more muscular strength to take more pull ups than core training group volley ball players [CTG]. Whereas combined plyometric and core training group volley ball players [CPCTG] had more muscular strength comparative to plyometric training group volley ball players [PTG] and core training group volley ball players [CTG] on pull ups test.

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