

# Effect of Circuit Resistance Training and Plyometric Training on Muscular Strength among Annamalai University Netball Players

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**Abstract:** *The purpose of the study was to find out the effect of circuit resistance training and plyometric training on muscular strength among Annamalai university netball players. To achieve this purpose of the study, forty five men students were selected as subjects who were from the various faculties, Annamalai University, Annamalainagar. The selected subjects were aged between 19 to 24 years. They were divided into three equal groups of fifteen each, Group I underwent circuit resistance training and Group II underwent plyometric training and Group III acted as control that did not participate in any special training apart from their regular sports and games practices. The subjects were tested on selected criterion variable such as muscular strength prior to any immediately after the training period. The selected criterion variable such as agility was measuring by leg lift dynamometer. The analysis of covariance (ANCOVA) was used to find out the significant differences if any, between the experimental groups and control group on selected criterion variable. The 0.05 level of confidence was fixed to test the significance, which was considered as an appropriate. The result of the present study has revealed that there was a significant difference among the experimental and control group on muscular strength.*

**Keywords:** muscular strength, circuit resistance training, plyometric training, netball.

## 1. Introduction

Physical fitness is most easily understood by examining these components, or elements, or parts i.e., (endurance, strength, speed, flexibility). Body composition is also considered as a component of fitness. It refers to the makeup of the body in terms of lean mass (muscle, bone, vital tissue and organs) and fat mass. An optimal ratio of fat to lean mass is an indication of fitness, and the right types of exercise will help to decrease body fat and increase or maintain muscle mass [1]. Training has been explained as a programme of exercise designed to improve the skills and increase the energy capacities of an athlete for a particular event. Training has been a part of human life since ancient times. It denotes the process of preparation for some task. Through systematic training programme one can improve his fitness both physically and mentally [2]. The concept of training is reflected in words or terms, which are given to separate components of training (technique training, strength training) or separate methods of procedures of doing physical exercise (interval training and circuit training). Training means are various physical exercises and their objective, methods and procedures, which are used for the improvement, maintenance and recovery of performance capacity and performance readiness. Physical exercises are the physical means of training. The other means are used in addition to physical exercises or separately as per requirement. Each training means has its own specific effect on the performance capacity. This effect may be direct or indirect. Physical exercises have a direct effect on performance capacity. Means like physiotherapy, autogenous training has indirect effect [3]. Circuit training is an interval training technique that minimizes rest between sets and exercises. It can consist of only weight training or alternating intervals of weight training and brief, high intensity cardiovascular exercise. Circuit resistance training

effectively reduces the time devoted to strength training while allowing an adequate training volume to be achieved. Nonetheless, circuit training has traditionally been performed using relatively low loads for a relatively high number of repetitions, which is not conducive to maximal muscle size and strength gain. Resistance training is an even broader term than weight training because resistance can be supplied by weights, machines, rubber strands and any number of other devices that resist the movement of the exerciser. It is nearly impossible to engage in any vigorous resistance training without getting stronger. However, strength training is a means of training with resistance that is focused on improving strength, as compared with muscle size. Resistance training, also known as strength or weight training has become one of the most popular forms of exercise to enhance an individual's physical fitness and condition athletes. The terms strength, weight and resistance trainings have all been used to describe a type of exercise that require to move (or attempt to move) against an opposing force usually presented by some type of equipments [4]. Plyometrics is defined as exercises that enable a muscle to reach maximum strength in as short time as possible. This speed strength ability is known as power. Although most coaches and athletes know that power is the name of the game, few have understood the mechanics, necessary to develop it. Plyometrics is a common training methodology used by competitive athletes to develop speed and power. Jumping, bounding, skipping, throwing or any basic recoil movement, which ballistically stretches muscles are characteristic of plyometric drills, and are characteristic of motions found virtually in energy sport. The acquisition of a more rapid and forceful contraction is the fundamental basis for engaging in plyometrics training. As with most forms of exercises there are varying degrees of difficulty of intensity.

Muscles, along with bones, provide for posture and movement in the human body muscles are our only muscles selected structures that can lengthen and shorten. Unlike the other supporting structures, ligaments and tendons, muscles possess a unique ability to impart dynamic activity to the body [5].

## 2. Methodology

The purpose of the study was to find out the effect of circuit resistance training and plyometric training on muscular strength among Annamalai university netball players. To achieve this purpose of the study, forty five men students were selected as subjects who were from the various faculties, Annamalai University, Annamalai nagar. The selected subjects were aged between 19 to 24 years. They were divided into three equal groups of fifteen each, Group I underwent circuit resistance training and Group II underwent plyometric training and Group III acted as control that did not participate in any special training apart from their regular sports and games practice. The experimental group underwent the training programme for three days per week for eight weeks. Among the selected variable such as muscular strength was measured by leg lift dynamometer. The data were collected at prior and immediately after the training programme for the selected variable. Analysis of covariance (ANCOVA) [6] was applied to analyze the data. In all the cases, 0.05 level was used to test this significance.

## 3. Results

The mean and standard deviation scores of pretest, posttest and adjusted posttest of muscular strength on circuit resistance training, plyometric training and control group are given in table. 'F' ratio test computed in regards to the muscular strength on circuit resistance training, plyometric training and control group in the pretest, posttest and adjusted post test are also presented in table.

**Table 1: Mean Standard Deviation And 'F' Ratio Of Circuit Resistance Training, Plyometric Training And Control Group On Muscular Strength**

		Circuit Resistance Training	Plyometric Training	Control Group	F ratio
Pre	Mean	89.46	89.73	89.86	0.25
	S.D	5.01	4.83	4.99	
Post	Mean	93.06	92.86	89.60	2.76
	S.D	4.87	4.67	3.99	
Ad Post	Mean	93.26	92.82	89.44	52.35*

Table shows the analysed data of muscular strength. The muscular strength pre means were 89.46 for the circuit resistance training group, 89.73 for plyometric training group and 89.86 for the control group. The resultant 'F' ratio of 0.25 was not significant at .05 levels indicating that the three groups were no significant variation. The post test means were 93.06 for the circuit resistance training group, 92.86 for plyometric training group and 89.60 for the control group. The resultant 'F' ratio of 2.76 at .05 level indicating that was no significant. The difference between the adjusted post-test means of 93.26 for the circuit resistance training group,

92.82 for plyometric training group and 89.44 for the control group yield on 'F' ratio 52.35 which was significant at .05 level.

The results of the study indicate that there is a significant difference among circuit resistance training, plyometric training and control groups on the muscular strength. To determine which of the paired means had a significant difference, Scheffe's post-hoc test was applied and the results are presented in Table II.

**Table 2: Scheffe's Test For The Difference Between The Adjusted Post-Test Paired Means Of Muscular Strength**

Adjusted Post-Test Means			Mean Diff.	Class Interval
Circuit Resistance Training	Plyometric Training	Control Group		
93.26	92.82		0.43	1.04
93.26		89.44	3.82*	1.04
	92.82	89.44	3.38*	1.04

The adjusted post test mean difference of muscular strength between circuit resistance training and plyometric training, circuit resistance training and control group and plyometric training and control groups are 0.43, 3.82 and 3.38 respectively.

## 4. Discussion

The results of the study showed that circuit resistance training and plyometric training groups have significantly differed on muscular strength when compared to control group, but between the training groups significant difference was not found. Hence it was concluded that both circuit resistance training and plyometric training was better method to increase the muscular strength.

Jackson [7] found out maximum strength and strength endurance training improve strength and muscular endurance. Luecke [8] find out different strength training improves strength and power. Plyometric training is a specific work for the enhancement of explosive power. It improves the relationship between maximum strength and explosive power [9].

## 5. Conclusion

Strength is key to success in modern athletics. It is much easier to improve than techniques. Strength may be defined as the neuromuscular capacity to overcome an external and internal resistance. It is fundamental to all sports and games. The genetic factors, which strength development are body type, length of the lever, insertion point of the muscle, muscle belly length, quality of the muscle and neuromuscular efficiency. Regardless of the above factors every one has the capacity of increasing muscle strength depending upon both the assets and limitations. For higher performance physical and motor fitness qualities should be developed harmoniously. Importance should be given based on their role in improving performance and preventing injury. Strength will always be important as a base and in some cases, the main physical quality needed in sports. However in close examination of almost all sports, it can be seen that strength is definitely important.

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