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## Effect of plyometric training and circuit training on speed muscular endurance among men volleyball players

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### Abstract

The purpose of the study was to find out the effect of plyometric training and circuit training on speed muscular endurance among men volleyball players. Twenty four male volleyball players aged between 18 to 25 years were selected randomly. They were divided into two groups (two experimental and one control group) the experimental group I was given plyometric training and experimental group II was given circuit training for six weeks and control group was not allowed to participate in any training programme. The independent variables is plyometric and circuit training dependent variable is speed, muscular endurance. The speed performance tested by twenty meter dash and muscular strength performance tested by bent knee sit ups and the performance recorded in counts. The collected data on speed and muscular endurance were statistically examined to the 't' test. The 't' ratio was the difference between the mean, standard deviation and standard error of the difference between the means. The results of the study reveals that the plyometric training and circuit training had significantly improved the speed and muscular endurance.

**Keywords:** Plyometric training, circuit training, speed, muscular endurance, 't' ratio

### Introduction

#### Plyometrics

Plyometric is the term now applied to exercise, that have their roots in "Europe" where they were first known simply as "jumping training".

Interest in this jump training increased during the early 1970's as east European athletes emerged as powers on the world sports scene. As the eastern bloc countries began to produce superior athletes in such sports as track and field, gymnastics, and weight lifting, the mystique of their success began to Centre on the training methods. (Donald. A. Chu, 1998) [3].

#### Importance of Plyometric Training

Plyometric is the name given for a type of exercise that is designed to increase intensity or explosive power in certain muscle groups. This kind of training is used to increase power of a boxer's punch or the force of volleyball and basketball player's jump. Plyometric training is different from traditional strength training exercise because it is performed quickly and explosively. It increase muscle power by capitalizing on lengthening and shortening of the muscle cycles. This kind of training usually starts with a rapid stretch of a muscle or eccentric phase followed by a rapid shortening of the same muscle (or) the concentric phase burpees, clap push-ups, jumping ropes, and jumping jacks are types of plyometric exercise. Several studies suggest that plyometric can greatly improve athletic performance in terms of vertical jumps, long jumps, sprinting, cycling, volleyball, basketball, kick boxing and many more. It is said that even one (or) two types of plyometric training completed one to three times in a week may improve motor performance with in 6 to 12 weeks. In addition to this, 3 sets of plyometric pushups may also increase upper body strength. (Donald. A. Chu, 1998) [3].

#### Circuit Training

Circuit training was invented in 1953 as effective and efficient way for coaches to train many athletes in a limited amount of time with limited equipment.

The exerciser moved through a series of weight training or calisthenics arranged consequently. It was past paced workout of 15 to 45 seconds per station with little (15 – 30 seconds) rest or no rest between stations.

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Today this is known as “circuit weight training” research has shown that it can increase muscular strength and endurance. There is mild improvement in aerobic stamina but only if the rest periods are kept very short. Another variation is “aerobic circuit training” aerobic station like treadmill, rower or stepper (1 to 5 minute per station) or interspersed with weight training stations. This protocol has been found to increase aerobic stamina and muscular endurance and endurance. (Dabir, R. Qureshi, 2012).

### Methodology

The purpose of the study was to find out the effect of plyometric training and circuit training on speed and muscular endurance among men volleyball players. To achieve the purpose of the study 24 men volleyball players in the age group 18 to 25 years were selected at random from various

engineering college in Chennai, Tamil nadu. Selected subjects were divided in to three groups of experimental I, experimental II and control group. The experimental group I participated combined plyometric training group and experimental group II circuit training group for the training period six weeks three alternate days per week. The control group were maintained their daily routine activities and no special training was given.

### Statistical Techniques

The collected data on speed and muscular endurance were statistically examined to the test. The various hypotheses formulated by the researcher for comparison ‘t’ ratio was used. ‘t’ ratio was the difference between the mean, standard deviation and standard error of the difference between the means.

**Table 1:** Computation of ‘t’ ratio between pre and post test scores of experimental group and control group on speed

Variables	Group Name	Mean		SD		SD Error	DF	‘t’ ratio
		Pre	Post	Pre	Post			
Speed	Experimental Group	3.64	3.54	0.24	0.21	0.012	11	8.33*
	Control Group	3.63	3.64	0.23	0.31	0.032		0.312

\*level of significance was fixed at 0.05 with df 11 table value is 2.20

The table I shows that the mean values of pre-test and post-test of experimental group in speed were 3.64 and 3.54 respectively. The obtained ‘t’ ratio was 8.33 since the obtained ‘t’ ratio was greater than the required table value of 2.20 for significance at 0.05 level of with 11 degrees of freedom it was found statistically significant. The mean values of pre-test and post-test of control group in speed were 3.63 and 3.64

respectively. The obtained ‘t’ ratio was 0.312 which was lesser than the table value of 2.20 for significance at 0.05 level of with 11 degrees of freedom it was found statistically insignificant. The result of this study statistically proved that the experimental group showed significant improvement on speed due to combined plyometric and circuit training on men volleyball players.

**Table 2:** Computation of ‘t’ ratio between pre and post test scores of experimental group and control group on muscular endurance

Variables	Group Name	Mean		Sd		Sd Error	Df	‘t’ ratio
		Pre	Post	Pre	Post			
Muscular Endurance	Experimental Group	40.00	44.75	7.73	6.63	0.41	11	11.58*
	Control Group	39.91	39.25	3.36	3.07	0.43		1.56

\*level of significance was fixed at 0.05 with df 11 table value is 2.20

The table II shows that the mean values of pre-test and post-test of experimental group in muscular endurance were 40.00 and 44.75 respectively. The obtained ‘t’ ratio was 11.58 since the obtained ‘t’ ratio was greater than the required table value of 2.20 for significance at 0.05 level of with 11 degrees of freedom it was found statistically significant. The mean values of pre-test and post-test of control group in muscular endurance were 39.91 and 39.25 respectively. The obtained ‘t’ ratio was 1.53 which was lesser than the table value of 2.20 for significance at 0.05 level of with 11 degrees of freedom it was found statistically insignificant. The result of this study statistically proved that the experimental group showed significant improvement on muscular endurance due to combined plyometric and circuit training on men volleyball players.

### Conclusions

1. It was concluded that there was significant improvement in speed due to plyometric and circuit training on men volleyball players.
2. It was concluded that there was significant improvement in muscular endurance due to plyometric and circuit training on men volleyball players.
3. The result of the study reveals that plyometric and circuit training would improve college men players speed and muscular strength significantly.

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