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## Impact of circuit training on physical and physiological variables of inter collegiate volleyball players

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### Abstract

This study was investigated the impact of circuit training on physical and physiological variables of intercollegiate volleyball players. To achieve the purpose of the study 40 volleyball players were selected from Cheran group of institutions, Coimbatore. The subjects was randomly assigned to two equal groups (n=20). Group- I underwent circuit training group CTG) and group - II was acted as control group (CG). The circuit training was given to the experimental group for 3 days per week (Monday, Wednesday and Friday) for the period of twelve weeks. The control group was not given any sort of training except their routine work. The physical fitness variables of flexibility (sit and reach test) agility (4x10 meter shuttle run) and Physiological variable Vo2 max (Queen College step test) before and after training period. The data collected from the subjects was statistically analysed with 't' test to find out significant improvement if any at 0.05 level of confidence. The result of the present circuit training significantly improved flexibility agility and Vo2 max of volleyball players.

**Keywords:** Circuit training, Flexibility, Agility and Vo2 max

### Introduction

Volleyball is a team sport in which two teams of six players are separated by a net. Each team tries to score points by grounding a ball on the other team court under organized rules. It has been a part of the official program of the Summer Olympic Games since 1964. The rally continues, with each team allowed as many as three consecutive touches, until either (1) a team makes a kill, grounding the ball on the opponent court and winning the rally; or (2) a team commits a fault and loses the rally. The team that wins the rally is awarded a point, and serves the ball to start the next rally. A league has been started in India for volleyball with six teams participating in four round robin format at four different venues (Bangalore, Chennai, Hyderabad and Yanam), i.e. one round at one venue. It is called Indian Volley League. The teams come from Chennai, Hyderabad, Mumbai and Yanam and two state teams Karnataka and Kerala.

Circuit training is a form of body conditioning or resistance training using high-intensity aerobics. It targets strength building and muscular endurance. An exercise & quot; circuit & quot; is one completion of all prescribed exercises in the program When one circuit is complete, one begins the first exercise again for the next circuit. Traditionally, the time between exercises in circuit training is short, often with rapid movement to the next exercise. The term & quot; circuit training & quot; describes the way a workout is structured rather than the type of exercise performed. It typically consists of a series of exercises or stations completed in succession with minimal rest in between. Circuit routines allow the athlete or coach to create an endless number of workouts and add variety to routine training programs. Circuit training is a type of exercise program where one does a series of timed exercises at a fairly rapid pace, with a brief period of rest in between each exercise. Circuit training workouts may target the entire body or just one specific area, such as the arms, legs, or chest. In addition, circuit training workouts may focus on strength training, aerobics, or a combination of the two; the possibilities are virtually limitless. In general, there are four types of circuit training workouts, and these include a timed circuit, a competition circuit, a repetition circuit, and a sport specific/running circuit. Each of these types of circuit training workouts can be effective and serve a different purpose depending on one existing level of physical fitness.

All of these circuit types can last as long as the exerciser chooses, but it is necessary to determine the full amount of time first. The first type of circuit training workout, a timed circuit, is the most basic. In this type, one simply sets time limits for periods of exercise and rest. For instance, one might exercise for 30 seconds, followed by a 30 second rest period, then switch to a different exercise for 30 seconds, followed by another rest period.

**Methodology**

In this study the selected 20 volleyball players selected from Cheran group of institutions, Coimbatore. The subjects were randomly assigned in to two equal groups namely, circuit training group (CTG) (n=20) and Control group (CG) (n=20). The respective training was given to the experimental group the 3 days per weeks (alternate days) for the training period of twelve weeks. The control group was not given any sort of training except their routine. The evaluated variables were flexibility was assessed by sit and reach test and the unit of measurement was in centimetre, agility was assessed by 4 x

10 meter shuttle run the unit of measurements was in seconds and Vo2 max was assessed by queen college step test the unit of measurement in counts.

**Training Programme**

The training programme was lasted for 60 minutes for session in a day, 3 days in a week for a period of 12 weeks duration. These 60minutes included 10 minutes warm up, 40 minutes for mobile surface strength training and 10 minutes and warm down. The equivalent in mobile surface strength training is the length of the time each action in total 3 day per weeks (Monday, Wednesday and Friday).

**Statistical Analysis**

The collected data before and after training period of 12 weeks on the above said variables due to the effect of circuit training was statistically analyzed with ‘t’ test to find out the significant improvement between pre and posttest. In all cases the criterion for statistical significance was set at 0.05 level of confidence. (p<0.05)

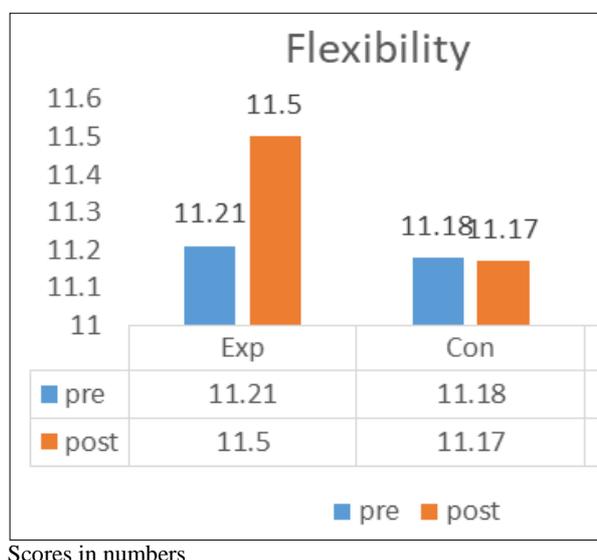
**Table 1:** Computation of ‘t’ ratio on physical and physiological variables on experimental group and control group (scores in numbers)

Group	Variables	Mean	N	Std. Deviation Pre	Std. Deviation Post	T ratio	
Experimental Group	Flexibility	Pre test	11.21	20	0.43	0.43	33.48*
		Post test	11.50	20			
	Agility	Pre test	11.36	20	0.009	0.011	62.86*
		Post test	11.31	20			
	VO2 Max	Pre test	126.20	20	4.09	3.38	11.00*
		Post test	120.70	20			
Control group	Flexibility	Pre test	11.18	20	0.45	0.46	1.45
		Post test	11.17	20			
	Agility	Pre test	11.36	20	0.01	0.01	1.83
		Post test	11.37	20			
	VO2 Max	Pre test	125.45	20	4.00	4.19	1.71
		Post test	125.65	20			

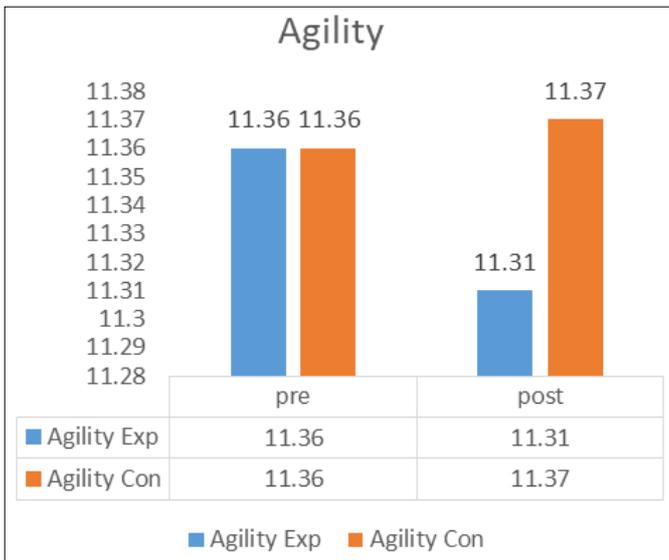
\*significant level 0.05 level degree of freedom (2.09, 1 and 19)

Table 1 reveals the computation of mean, standard deviation and ‘t’ ratio on selected physical parameters namely flexibility agility and vo2 max experimental group. The obtained ‘t’ ratio on flexibility agility and vo2 max were 33.48, 62.86 and 11.00 respectively. The required table value was 2.09 for the degrees of freedom 1 and 14 at the 0.05 level of significance. Since the obtained ‘t’ values were greater than the table value it was found to be statistically significant.

Further the computation of mean, standard deviation and ‘t’ ratio on selected variables namely flexibility, agility and vo2 max control group. The obtained ‘t’ ratio on flexibility, agility and vo2 max were 1.45, 1.83 and 1.71 respectively. The required table value was 2.14 for the degrees of freedom 1 and 14 at the 0.05 level of significance. Since the obtained ‘t’ values were lesser than the table value it was found to be statistically not significant.

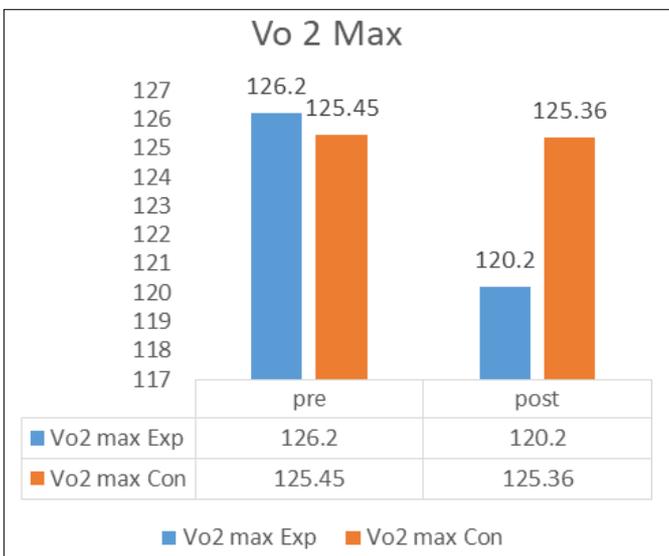


**Fig 1:** Bar diagram showing the mean value on Flexibility of Volleyball players on Experimental and Control group



Scores in numbers

**Fig 2:** Bar diagram showing the mean value on Agility of volleyball players on Experimental and Control group



Scores in numbers

**Fig 3:** Bar diagram showing the mean value on Vo2 Max of volleyball players on Experimental and Control group

### Discussion and Findings

The results of this study showed that the subjects participated in circuit training for the period of twelve weeks was able to improve their performance in physical and physiological variables. After analysing the results, the researcher found that there were significant differences among the experimental and the control group. The exercisers showed improved quadriceps strength, reaction time and reduced body sway when compared with the control group; the exercise group showing continued improvement through out the programme in tests of body sway. The findings suggest that exercise can improve physical function in older people. Kundukulam, M. V According to the study& findings, there was a significant improvement ( $p < 0.05$ ) in flexibility due to strength training when compared to the control group. This improvement in physical and physiological parameters is beneficial for volleyball players while performing their game. Finally, it is worth reporting the absence of injury during that investigation confirms that circuit training in volleyball players helps to avoid injury risk when the correctly designed and competently supervised, physical and physiological level

of young volleyball players can be improved with a combined programs of circuit training. The physical and physiological improvements are usually seen an essential in volleyball performance. On the other hand given specific nature of the selected exercises (circuit training) and their incorporation in the training routines are fundamental for volleyball players.

### Conclusions

1. It was concluded that 12 weeks of circuit training significantly improved the flexibility on inter collegiate volleyball players.
2. It was concluded that 12 weeks of circuit training significantly improved the agility on inter collegiate volleyball players.
3. It was concluded that 12 weeks of circuit training significantly improved the Vo2 max on inter collegiate volleyball players.

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