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## Effect of low and moderate intensity circuit training on physical components among college male football players

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### Abstract

The purpose of this investigation was to find out the effect of low and moderate intensity circuit training on speed and agility among college male football players. Forty five male college football players ( $n = 45$ ) were randomly selected from the Government Degree College, Kulgam. The ages were ranged between 18 and 22 years. The selected subjects were randomly assigned into three equal groups with fifteen subjects each ( $n = 15$ ) as low intensity circuit training group (LICTG) moderate intensity circuit training group (MICTG) and control group (CG). The experimental groups underwent their respective experimental treatment for twelve weeks 5 days per week and session on each day. The control group (CG) did not expose any special training apart from their regular activities. The speed and agility was taken as dependent variables for the study and was measured by using 50 meter dash and 20 meter shuttle run. Analysis of covariance (ANCOVA) was used to analyze the collected data. The result revealed that the low and moderate intensity circuit training was made significant improvement ( $p \leq 0.05$ ) on physical variables of selected subjects. The level of confidence was fixed at 0.05 levels.

**Keywords:** circuit training, speed, agility

### Introduction

Physical fitness is the capacity to carry out reasonably well various forms of physical activities without being unduly tired and includes qualities important to the individuals' health and well being. Physical fitness is an ability to carry out daily tasks with vigour and alertness, without undue fatigue and with ample energy to enjoy leisure time pursuits and to meet any unforeseen emergencies. Physical fitness signifies the body's ability to work efficiently and effectively during school hours and at leisure time. A physically fit person is someone who will remain healthy and lead an active lifestyle. Also being physically fit allows a person to safeguard his/her body against diseases, and live a longer healthier life (Lund & Tannehill, 2010) [9].

Low intensity circuit training may be defined as 50% - 65% of circuit training exercises performed in planned sequence is known as low intensity circuit training.

Moderate intensity circuit training means 65% - 80% of circuit training exercises performed in shortest possible time is known as moderate intensity circuit training.

Circuit training is a popular form of sports workout that targets aerobic fitness and muscular endurance simultaneously. In a circuit training session, participants work through a series of 6 to 10 or more exercises for either a set time or number of repetitions, with little or no rest between exercises. Some circuits may involve use of exercise equipments. Others may use only body weight exercises. Others may combine both. Circuits can be organized in a number of ways to challenge the participants and keep the workout fresh and interesting (Patric, 2014). Circuit training is a program in an athlete moves from one exercise station to another planned sequence and in the shortest possible form. In planning a circuit training programme exercise are chosen to fit the needs of the individuals each of these exercise them numbered and assigned to a certain area called station (Neal, 1969) [10].

The term circuit training 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.

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Through circuit training the athletes may increasing their strength and endurance by in area sing the repetitions of exercise at each station or by doing the required frequencies of exercise in a shorter length of form. If the work load is kept constant, the athletes can develop strength and endurance by gradually decreasing the time taken to go through the circuit (Morgan, 1957)<sup>[8]</sup>.

Circuit training is formal type of training in which an athlete goes through a series of selected exercises or activities that are performed in sequences or in a circuit. Circuits can be setup inside gymnasiums, exercise rooms, or outside on courts and fields. There are usually six to ten stations in a circuit (Robert Kulu, 1963)<sup>[7]</sup>.

Speed is the ability to move from one pace to another in the shortest possible time. It is primarily innate yet it can be improved through practice for technique and movement efficiently, (Carl., Gabbard, 1987)<sup>[2]</sup>. Agility is the ability to change the direction of the body in an efficient and effective manner, (Prenticce, 1994)<sup>[3]</sup>.

### Methodology

The purpose of this study was to investigate the effect of low and moderate intensity circuit training on speed and agility among college male football players. Forty five male college students (n = 45) were randomly selected from the Government Degree College, Kulgam. The ages were ranged

### Results

Analysis of covariance for the pre and post test on physical variable speed of low intensity circuit training, moderate intensity circuit training and control groups (In Seconds)

Test	LICT	MICT	Control	SOV	SS	DF	MS	F
Pre test Mean SD(±)	8.36 0.17	8.21 0.11	8.36 0.27	BG	0.22	2	0.11	2.93
				WG	1.61	42	0.03	
Post test Mean SD(±)	7.82 0.17	7.21 0.11	8.37 0.27	BG	10.07	2	5.04	127.94*
				WG	1.65	42	0.03	
Adjusted Post test Mean	7.78	7.30	8.32	BG	7.06	2	3.53	634.84*
				WG	0.22	41	0.06	

\*Significant at .05 level of confidence.

(The table value required for significance at .05 level of confidence for 2 and 42 and 2 and 41 are 3.222 and 3.226 respectively).

Table I shows that on the variable Speed, the pre test mean values of low intensity circuit training, moderate intensity circuit training and control groups are 8.36, 8.21 and 8.36 respectively. The obtained 'F' ratio of 2.93 for pre test scores is lesser than the table value of 3.222 for df 2 and 42 required for significance at .05 level of confidence.

On the variable Speed, the post test mean values of low intensity circuit training, moderate intensity circuit training and control groups are 7.82, 7.30 and 8.32 respectively. The obtained 'F' ratio value of 127.94 for post test scores is greater than the table value of 3.222 for df 2 and 42 required for significance at .05 level of confidence.

On the variable Speed, the adjusted post test mean values of low intensity circuit training, moderate intensity circuit training and control groups are 7.78, 7.30 and 7.32 respectively. The obtained 'F' ratio value of 634.84 for adjusted post test scores is greater than the table value of 3.226 for df 2 and 41 required for significance at .05 level of confidence on speed.

The results of the study indicated that there is a significant

difference among the adjusted post test means of low intensity circuit training, moderate intensity circuit training and control groups on the variable Speed. To determine the significance difference among the three paired means, the Scheffe's test was applied as post hoc test and the results are presented in table-IA.

**Table IA:** The scheffe's test for the difference between paired means on speed

LICT	MICT	CG	Mean Difference	CI
7.78	7.30		0.48*	0.07
7.78		8.32	0.54*	0.07
	7.30	8.32	1.01*	0.07

\*Significance at .05 level of confidence.

The results of the study showed that both the experimental groups (LICT and MICT) differ significantly from the control group (CG) with respect to speed and also there is significant difference between the two experimental groups (LICT and MICT) on the variable speed.

The pre, post and adjusted post test mean values of experimental groups and control group on speed were graphically represented in figure I.

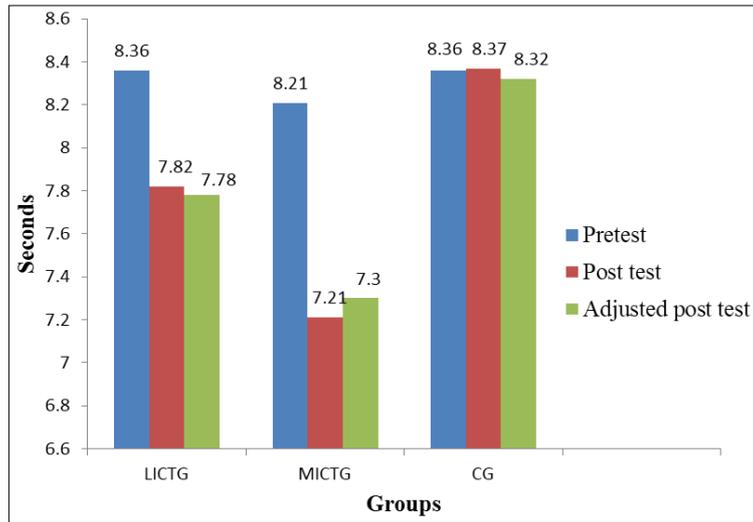


Fig 1: The pre, post and adjusted post test mean values of experimental groups and control group on speed.

Table 2: Analysis of covariance for the pre and post test on physical variable agility of low intensity circuit training, moderate intensity circuit training and control group (In Seconds)

Test	LICT	MICT	Control	SOV	SS	DF	MS	F
Pre test Mean SD(±)	13.88 0.23	13.67 0.28	13.88 0.37	BG	0.41	2	0.20	2.23
				WG	3.89	42	0.09	
Post test Mean SD(±)	13.04 0.15	12.60 0.28	13.06 0.40	BG	12.23	2	6.11	67.65*
				WG	3.97	42	0.09	
Adjusted Post test Mean	12.99	12.70	13.81	BG	9.36	2	4.68	125.15*
				WG	1.53	41	0.03	

\*Significant at .05 level of confidence.  
 \*Significant at .05 level of confidence.

(The table value required for significance at .05 level of confidence for 2 and 42 and 2 and 41 are 3.222 and 3.226 respectively).

Table II shows that on the variable Agility, the pre test mean values of low intensity circuit training, moderate intensity circuit training and control groups are 13.88, 13.67 and 13.88 respectively. The obtained 'F' ratio of 2.23 for pre test scores is lesser than the table value of 3.222 for df 2 and 42 required for significance at .05 level of confidence.

On the variable Agility, the post test mean values of low intensity circuit training, moderate intensity circuit training and control groups are 13.04, 12.60 and 13.06 respectively. The obtained 'F' ratio value of 67.65 for post test scores is greater than the table value of 3.222 for df 2 and 42 required for significance at .05 level of confidence.

On the variable Agility, the adjusted post test mean values of low intensity circuit training, moderate intensity circuit training and control groups are 12.99, 12.70 and 13.81 respectively. The obtained 'F' ratio value of 125.15 for adjusted post test scores is greater than the table value of 3.226 for df 2 and 41 required for significance at .05 level of confidence on speed.

The results of the study indicated that there is a significant difference among the adjusted post test means of low intensity circuit training, moderate intensity circuit training and control groups on the variable Agility.

To determine the significance difference among the three paired means, the Scheffe's test was applied as post hoc test and the results are presented in table – 1IA.

Table 1IA: The scheffe's test for the difference between paired means on agility

LICT	MICT	CG	Mean Difference	CI
12.29	12.70		0.22*	0.17
12.29		13.81	0.82*	0.17
	12.70	13.81	1.11*	0.17

\*Significance at .05 level of confidence.

From the Table IA it is imperative that there is a significant difference between low intensity circuit training group (LICTG) - control group (CG) moderate intensity circuit training group (MICTG) and control groups (CG) on agility. Therefore twelve weeks of moderate intensity circuit training

(MICT) showed greater improvement than low intensity circuit training (LICT) on agility.

The pre, post and adjusted post test mean values of experimental groups and control group on agility were graphically represented in figure II.

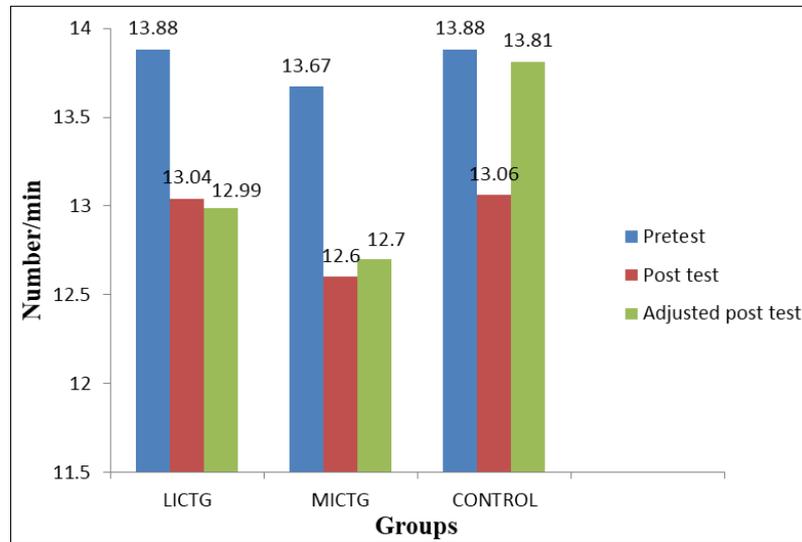


Fig 2: The pre, post and adjusted post test mean values of experimental groups and control group on agility.

### Discussion

The result of the present study pointed out that there was a significant difference on speed and agility due to low and moderate intensity circuit training. The current study utilizes twelve week training programme and a session in a day found that speed and agility increases due to low and moderate intensity circuit training. The findings are also in agreement with the findings of Kumar (2016) [1], the results of the study stated that the Circuit Training had significantly improved the speed among male football players. Arun & Johnson (2015) [6] also conducted a study on influence of different intensities circuit training on speed. Andualem & Demena (2016) [4] also concluded that physical variable namely speed was significantly improved due to different intensities of circuit training. The result of the present study pointed out that there was a significant difference on agility. The above findings in consonance with the findings of Andualem & Demena (2016) [4] conducted a study to explore agility among male football players. Kumar (2016) [1] investigated the effect of circuit training on selected motor abilities among male football players. The study showed that there was a significant improvement on physical variable agility. Milanovic *et al* (2013) [5] conducted the study on the effects of 12 week conditioning programme involving speed, agility and its effect on agility performance in young soccer players.

From the results of the present study and literature, it is concluded that dependent variable namely speed and agility was significantly improved due to low and moderate intensity circuit training.

### Conclusion

Low and moderate intensity Circuit training have been shown to increase factors associated with speed and agility. In summary, the speed and agility can be improved during the age between 18 and 22 years of male football players and favor the prescription of low and moderate intensity circuit training programme during the initial adaptation period. There was also significant difference among experimental groups for speed and agility, it can be concluded from the result that varied intensity circuit training is best method to improve speed and agility.

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