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## Effect of circuit training on speed, agility and explosive power among inter collegiate handball players

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### Abstract

The purpose of the present study was to find out the effect of circuit training on selected Physical Fitness variables among Inter Collegiate Men Handball players. To achieve the purpose of the study thirty inter collegiate Handball players in an age group of 19 to 25 were selected as subjects from the Arts and Science College. All the subjects were Under Graduate students. The selected subjects were divided in to two equal groups of fifteen subjects each as experimental group and control group. Both the group underwent their routine Handball Training and in addition of the above training the experimental group underwent specified circuit training morning one hour before starting the Handball Training in a schedule of weekly three days for the duration six weeks. The physical fitness variables of speed, agility and explosive power were selected as dependent variables. The pre and post tests were conducted before and after the six weeks experimental training. The collected data's were statistically analyzed by using ANCOVA to find out the significant difference between the groups if any. In all cases 0.05 level of confidence was fixed as a level of confidence to test the hypothesis. It was concluded from the result of the study that the experimental group significantly improved the selected physical fitness variables of speed, agility and explosive power due to six weeks circuit training.

**Keywords:** Physical fitness, speed, agility, explosive power

### Introduction

Circuit training program was developed by R.E. Morgan and G.T. Anderson in 1953 at the University of Leeds in England. There onwards this training is become one of the training to improve the physical fitness qualities of athletes. Circuit training is a workout routine that combines cardiovascular fitness and resistance training. The initial routines were arranged in a circle by doing the different set of exercise in a sequence alternating one another and thereby it is named as circuit training. By allowing only a short rest interval of 30-90 seconds between stations, cardiovascular fitness is gained along with the benefits of other related training effect. The different exercises in different stations are fixed depends on the trainees training state, age and demand to improve physical fitness and physiological qualities.

Circuit training is a method of physical conditioning in which one moves from one exercise to another, usually in a series of different stations or pieces of equipment Circuit training is a style of training that develops overall fitness. Performed regularly, circuit training will simultaneously improve muscular strength, endurance, cardiovascular fitness, and flexibility. "Circuit training is a method of fitness training that is designed to develop general, all-round physical and cardiovascular fitness" (Scholich, 1990) [7]. It is an excellent training program for improving different type of physical fitness abilities based on the program in different stations. In sports training the coaches are applying various means and methods to make their athletes run faster, jump higher and move quicker than ever before to achieve higher performance. Present study was undertaken to find out the effect of specified circuit training on certain physical fitness variables. Circuit training has gained popularity as a training strategy due to its improvement in different physical fitness qualities. Sudhakar Babu and Paul Kumar (2013) [8] conducted a study on the effect of selected circuit training exercises on sprinters of high school girls. They have found out that the experimental group improved the physical fitness qualities as well as sprinting performance. Punitha and Mahaboobjan (2017) [6] found six weeks circuit training significantly improved the leg explosive power and abdominal strength endurance of inter college women Kabaddi players.

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Manohar and Sarvesh Kumar Yadav (2011) [4] conducted a study on the effects of circuit training for the development of vertical jumping ability, endurance, agility and skill ability in Football players' boys aged 10 to 12 Years. It was found out the circuit training had benefited in improving all the selected physical fitness qualities. Ashish phulkar (2017) [1] found that 12 weeks circuit resistance training and aerobic circuit resistance training significantly improved the leg explosive power of male football players Taşkin (2009) [9] found that circuit training, which is designed to be performed 3 days a week during 10 weeks of training, improves sprint-agility and anaerobic endurance

Circuit training is one of the well-known training methods to improve the physical fitness due to its nature of the activity. The present study was intended to assess the effect of circuit training on the selected physical fitness qualities of speed, agility and explosive power among inter collegiate Handball players.

**Methodology**

To achieve the purpose of the study thirty inter collegiate Men Handball players were selected subjects in an age group of 19 to 25 from Arts and Science College. The selected subjects were divided in to two equal groups of fifteen subjects each as experimental group and control group. Both the group underwent their routine Handball Training. In addition of the above training the experimental group underwent specified circuit training morning one hour before starting the Handball Training in a schedule of weekly three days for the duration of six weeks.

**Circuit training procedure**

The six weeks circuit training was designed in emphasizes the necessity of the needs of fitness development of Inter Collegiate Handball players with the age group of 19 to 23 years. The following combination of eight different exercises were designed in the circuit training program

1. Jump Rope-2 minutes
2. Push-ups -20 reps
3. Jumping jack -30 reps
4. Step ups 2 minutes
5. Sit ups- 1 minutes/ 15 reps
6. Shuttle run- 6x10 meter
7. Body weight Squats -20 reps
8. Sprint -30 meter

The above circuit training was performed weekly three days in alternative days for the duration of six weeks. Each exercise was carried out in specified repetitions with 3 rotations. Rest intervals were 10 seconds between each exercise and 3 minutes between sets for the duration of one hour.

**Administration of tests**

The pre and post tests were administered before and after the six weeks training period. The test administered were physical fitness variables of speed (50 mts dash), agility (4x10 mts. shuttle run) and explosive power (Vertical Jump). All the tests were administered through standardized testing procedure.

**Statistical Procedure**

The collected data were statistically examined by analysis of covariance (ANCOVA) and the results have been presented in Table 1, 2 and 3.

**Results and Discussions**

**Analysis of covariance of Physical Fitness variables**

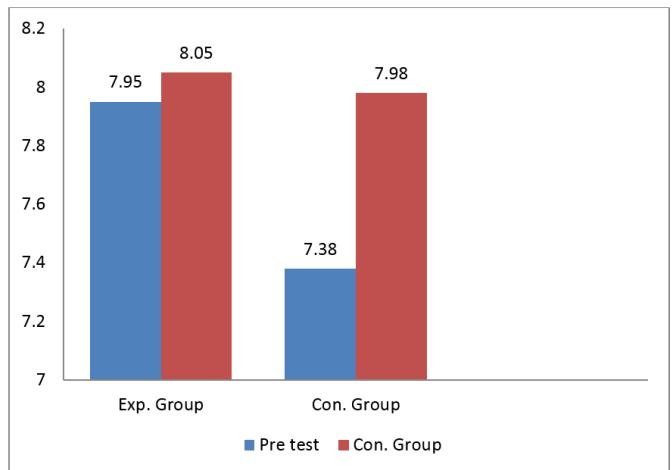
The analysis of covariance on the data obtained for speed, agility and explosive power of pre and post tests were tabulated and presented in the tables 1, 2 and 3.

**Table 1:** Computation of analysis of covariance on Speed

Test	Group		sv	Sum of Squares	df	Mean Square	F value
	Exp.	Con.					
Pre test	7.95	8.05	B	0.078	1	0.078	0.25
			W	8.449	28	0.301	
Post test	7.38	7.98	B	2.724	1	2.724	12.41*
			W	6.142	28	0.219	
Adjusted Mean	7.41	7.95	B	2.104	1	2.103	27.08*
			W	2.097	27	0.077	

\*Significant at 0.05 level of confidence

It was observed from the Table-1 that there was no significant difference in the pretest (F= 0.25 < 4.20). A significant difference in the post test (F= 12.41 > 4.20) for df 1 and 28 and adjusted posttest (F= 27.08 > 4.21) for df 1 and 27 at 0.05 level of confidence. It clearly indicated that there was an impact on speed through circuit training among Inter Collegiate Handball players.



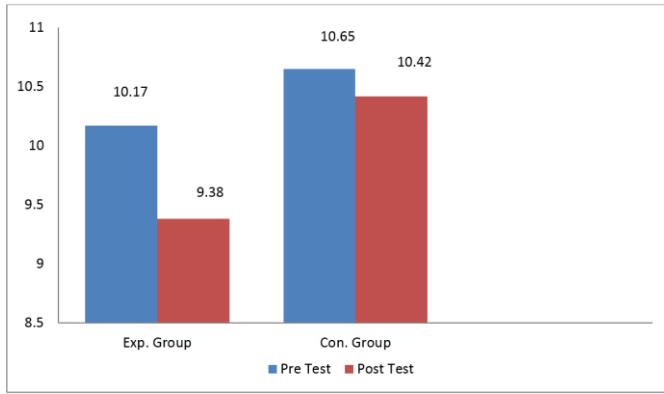
**Fig 1:** Bar Diagram showing the pre and post test mean values of Speed

**Table 2:** Computation of analysis of covariance on Agility

Test	Group		sv	Sum of Squares	df	Mean Square	F value
	Exp.	Con.					
Pre test	10.17	10.65	B	1.728	1	1.728	1.77
			W	27.304	28	0.975	
Post test	9.38	10.42	B	8.070	1	8.070	9.73*
			W	23.201	28	0.828	
Adjusted Mean	9.57	10.24	B	3.184	1	3.183	11.66*
			W	7.368	27	0.272	

\*Significant at 0.05 level of confidence

It was observed from the Table-2 that there were no significant difference in the pretest (F=1.77 < 4.20). The significant differences were observed in posttest (F=9.73 > 4.20) for df 1 and 28 at 0.05 level of confidence and adjusted posttest (F=11.66 > 4.21) for df 1 and 27 at 0.05 level of confidence. It clearly indicated that there was significant impacts in agility due to circuit training among inter collegiate Handball players.



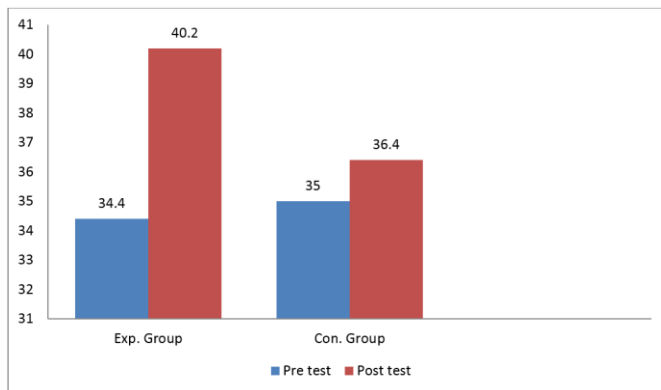
**Fig 2:** Bar Diagram showing the pre and post test mean values of Agility

**Table 3:** Computation of analysis of covariance on Explosive Power

Test	Group		sv	Sum of Squares	df	Mean Square	F value
	Exp.	Con.					
Pre test	34.4	35	B	2.7	1	2.7	0.14
			W	511.6	28	18.271	
Post test	40.2	36.4	B	108.3	1	108.3	5.57*
			W	544	28	19.428	
Adjusted Mean	40.47	36.12	B	141.389	1	141.389	35.05*
			W	108.904	27	4.033	

\*Significant at 0.05 level of confidence

It was observed from the Table-3 that there were no significant difference in the pretest ( $F=0.14 < 4.20$ ). The significant differences were observed in posttest ( $F=5.57 > 4.20$ ) for df 1 and 28 at 0.05 level of confidence and adjusted posttest ( $F=35.05 > 4.21$ ) for df 1 and 27 at 0.05 level of confidence. It clearly indicated that there was significant impacts in explosive power due to circuit training among inter collegiate Handball players.



**Fig 3:** Bar Diagram showing the pre and post test mean values of Explosive power

**Conclusions**

On the basis of the results and discussions the following conclusions are drawn.

1. Circuit training method is beneficial to improve the physical fitness qualities of speed, agility and explosive power of Handball players
2. Circuit training may be included in the sports training regime to improve physical fitness qualities
3. It was concluded that circuit training is a useful and perhaps optimal training strategy to do the exercise with interest due to different stations and different nature of activity.

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