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Effects of different circuit training methods on agility and speed ability: A comparative study

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ABSTRACT

The intention of present study was to investigate the effects of continuous and interval circuit training on agility and speed ability of secondary level school students. Total 60 boys' students, age level 13 to 16 years were randomly selected as sample from Purulia district of West Bengal, India. Samples were equally divided into three groups: continuous circuit training group (CCT), interval circuit training group (ICT) and Control group (CG). CCT and ICT groups participated in specific training programme for three days per week; the training was composed for 12 weeks. On the other hand, CG was on normal life activity. The data was collected before and after the application of training protocol on agility and speed. 't' test and ANOVA was used to find out the statistical significance. The level of significant for the study was selected as 0.05. The investigation concluded that interval and continuous circuit training does have significant positive effect to enhance Physical fitness components speed and agility even after 12 weeks of training on secondary level school students.

Keywords: Sports Training, circuit training, Interval Training, Continuous Training, Speed, Agility.

1. INTRODUCTION

Current Sports training is an extremely popular impression in whole world because sports performance is the most discussible phenomenon. Sports' training is a particular process of preparation of sports personnel based on systematic and scientific principles designed at improving and maintaining advanced performance ability in different sports activities. There are different methods of sports training, such as circuit training, continuous training, interval training, plyometric training, weight training, fartlek training etc. Among all these Circuit training processes was founded by R. E. Morgan and G. T. Adamson. Aim of Circuit training can be designed to develop strength, muscular endurance, speed, agility, neuromuscular-coordination, flexibility, cardiovascular endurance etc. Several research investigations have even established that circuit training is the most competent way to enhance muscle endurance, speed, agility etc. In sports area motor abilities, as capability specify limits that impact the person's prospective for performance success in skills. The circuit training design utilizes a set of 8 to 10 exercises which will be performed exercise one after another. Every exercise is performed for a particular number of repetitions or for a particular time period prior to move on to the next exercise. It provides an attractive preparation environment for the athlete and there are composed times and intensity to encourage the athlete to prolong mobility and staying power.

Circuit training is an excellent way to improve overall fitness level for an athlete and also for general people. Peoples are gradually being inactive because society gets active supports by machine. Actually, machine can give production approximate ten times more than manual production, so generally we are depending very much on machine for socio economical demand. Inactivity, type of lifestyle, mental depression these types of several phenomenon generate various types of hypo kinetic diseases and health risks factors in whole world. Need to keep in our mind Inactive lifestyle can make a rigid wall for health progress. It may be physical health, mental health or social health. To make peace in life for the purpose of profession, daily house work, recreation, social work, family work, require to engage with various types of physical or mental activities. Some training or special support of learning can help to human for bring a value life. It may be in the field of general education, sports, mechanical, agriculture etc. Activity and physical movement help to maintain our normal physical fitness, Control the weight, minimize the risk of heart disease, minimize the risk for diabetes, Strengthen the bones and muscles, Improve the mental health and improve the ability to do daily activities. Traditionally, it has been viewed as a combination of factors that are basic to all movements involving such elements of physical fitness as strength, speed, agility, flexibility and so on. Sports training and series of exercises are very important for sports performers as well as for general people. For application of any sports training or exercises schedule maintain some principles and special demand such as Who is the trainee, what is the capacity of performer, volume of the training,

intensity of the training, surrounded environmental condition, age and sex of trainee etc. These are most vital for success in performance. The investigator tries to investigate the effects of continuous and interval circuit training on agility and speed ability of secondary level school students.

2. LITERATURE REVIEW

Kumar (2016) conducted a study to find out the effect of circuit training on selected motor abilities among university male students. Total 60 boys, age ranged from 18 to 25 years were purposively divided into two groups. Group-A were subjected to 8-week of Circuit Training Program and Group-B acted as control. The results of the study concluded that the Circuit Training had significantly enhanced the speed, leg power, arm power and agility of the subjects.

Al-Haliq (2015) conducted a study on using the circuit training method to promoting the physical fitness components of the Hashemite University freshmen students who were enrolled in the Physical Fitness Course. The result of the study emphasizes that using recruit training method leads to promote the physical fitness components among the participants.

Reddy (2012) compared various methods of circuit training on performance variables of SC/ST and non-SC/ST boys. The study was conducted on randomly selected 60 students from secondary school. Then 30 SC/ST students were divided into three groups, named as Continuous Circuit Training Group (CCT), Interval Circuit Training Group (ICT) and Control Group (CT). Another 30 non-SC/ST students were divided into same like SC/ST group. Moreover, both SC/ST and non-SC/ST boys improved their performance on shuttle run (agility), standing broad jump (leg strength), 800 M (endurance) in general through continuous and Interval circuit training methods.

3. OBJECTIVES OF THE STUDY

- To find out the training effect of continuous circuit training on Agility and Speed ability.
- To find out the training effect of interval circuit training on Agility and Speed ability.
- To find out any changes occur on Agility and Speed ability of a control group.
- To compare the training effect of continuous circuit training, interval circuit training and a control group in respect of Agility and speed ability.

4. HYPOTHESES OF THE STUDY

H₀1: There would be no significant changes occur in Agility due to Interval Circuit Training Programme.

H₀2: There would be no significant changes occur in Agility due to Continuous Circuit Training programme.

H₀3: There would be no significant changes occur in Agility of Control Group.

H₀4: There would be no significant changes occur in Speed due to Interval Circuit Training Programme.

H₀5: There would be no significant changes occur in Speed due to Continuous Circuit Training programme.

H₀6: There would be no significant changes occur in Speed of Control Group.

H₀7: There would be no significant different in Agility among Continuous Circuit Training Group, Interval Circuit Training Group and Control Group.

H₀8: There would be no significant different in Speed ability among Continuous Circuit Training Group, Interval Circuit Training Group and Control Group.

5. POPULATION OF THE STUDY

Researchers selected all the school going students those who are 13 to 16 years old from Purulia district of West Bengal as the population of the study.

6. SAMPLE OF THE STUDY

60 school going students were randomly selected as the sample from Purulia district of West Bengal. Total sample was equally divided by three deferent groups. Therefore, twenty students were there in each group.

7. CRITERION MEASURES

The following variables of the subjects was measured through-

- Speed was measured in seconds by 50 yards dash.
- Agility was measured in seconds by 4 x 10m shuttle run.

8. TRAINING PROTOCOL

Experimental group- I undergoing in interval circuit training method whereas experimental group-II undergoing in continuous circuit training method and group- III is in under of control. Interval circuit training and Continuous circuit training both methods were composed by eight stations with eight deferent types of physical Exercises. The different stations for both of experimental group I and II was similar but duration of recovery time and one station to another station distance reaching process was different to each other. For continuous circuit training group there was no recovery time to again start the same circuit but Interval circuit training group taken active rest to again start the circuit. Total three circuits performed by both of experimental groups for a day. The training schedule keep up for three days per week. Total training period was taken for 12 weeks. Group III was the control group which does not participate in any training except their daily routines.

9. ANALYSIS AND INTERPRETATIONS

Table 1: Compare between pre and post test score or mean of Continuous circuit training, interval circuit training & control group on agility and speed.

S. No	Variables	Group	N	df	Pre-test			Post-test			't' Value
					Mean	S.D	Std-Error mean	Mean	S.D	Std-Error mean	
1	Agility	I.C.T	20	19	11.70	.590	.132	11.27	.565	.126	8.34*
		C.C.T	20	19	12.21	.881	.197	11.52	.770	.172	5.28*
		C.G	20	19	11.82	.809	.180	11.92	.662	.148	-1.07
2	Speed	I.C.T	20	19	8.26	1.00	.225	7.453	.642	.143	7.66*
		C.C.T	20	19	8.14	.733	.163	7.611	.652	.146	6.58*
		C.G	20	19	8.86	1.28	.286	8.99	1.42	.319	-.82

*Significant at 0.05 level

Table 2: Inferential statistics with 'ANOVA' on agility and speed of continuous circuit training, interval circuit training & control group on post test score.

Variables	Source of Variation	Sum of Squares	df	Mean Square	F- Value	Sig
Agility	Between Groups	4.259	2	2.130	4.73*	.013
	Within Groups	25.671	57	.450		
Speed	Between Groups	28.582	2	14.291	14.90*	.001
	Within Groups	54.665	57	.959		

F_{0.05} (2, 57) = 3.15

Table 3: Critical Difference of Agility and Speed.

		(I) Training_ Methods	(J) Training_ Methods	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
AGILITY	LSD	CCT	ICT	.253	.212	.238	-.172	.678
			CG	-.394	.212	.068	-.819	.030
		ICT	CG	-.253	.212	.238	-.678	.172
	CG	CCT	ICT	-.647*	.212	.003	-1.072	-.222
		CCT	CG	.394	.212	.068	-.030	.819
		ICT	CG	.647*	.212	.003	.222	1.072
SPEED	LSD	CCT	ICT	.157	.309	.613	-.462	.778
			CG	-1.379*	.309	.000	-1.999	-.759
		ICT	CG	-.157	.309	.613	-.778	.463
	CG	CCT	ICT	-1.536*	.309	.000	-2.157	-.916
		CCT	CG	1.379*	.309	.000	.759	1.999
		ICT	CG	1.536*	.309	.000	.916	2.157

*Significant at 0.05 level

10. RESULTS AND DISCUSSION

10.1. Testing of H1

Table 1 shows that the mean of Agility for Interval Circuit Training Group of pre test and post test are 11.70 and 11.27 and the standard deviations are .590 and .565 respectively. The calculated 't' value is 8.34 which is greater than that of critical 't' value for the degree of freedom 19. So, the calculated 't' value is significant at 0.05 level of significance. Result revealed that there is significant difference exists between pre test and post test of agility. So the null hypothesis (H₀₁) "There would be no significant changes occur in Agility due to Interval Circuit Training Programme" is rejected.

10.2. Testing of H2

Table 1 shows that the mean of Agility for Continuous Circuit Training Group of pre test and post test are 12.21 and 11.52 and the standard deviations are .881 and .770 respectively. The calculated 't' value is 5.28 which is greater than that of critical 't' value for the degree of freedom 19. So the calculated 't' value is significant at 0.05 level of significance. Result revealed that there is significant difference exists between pre test and post test of agility. So the null hypothesis (H₀₂) "There would be no significant changes occur in Agility due to Continuous Circuit Training programme." is rejected.

10.3. Testing of H3

Table 1 shows that the mean of Agility for Control Training Group of pre test and post test are 11.82 and 11.92 and the standard deviations are .809 and .662 respectively. The calculated 't' value is 1.07 which is less than that of critical 't' value for the degree of freedom 19. So, the calculated 't' value is not significant at 0.05 level of significance. Result revealed that there is no significant difference exists between pre test and post test of agility. So the null hypothesis (H₀₃) "There would be no significant changes occur in Agility of Control Group." is Accepted.

10.4. Testing of H4

Table 1 shows that the mean of Speed for Interval Circuit Training Group of pre test and post test are 8.26 and 7.45 and the standard deviations are 1 and .642 respectively. The calculated 't' value is 7.66 which is greater than that of critical 't' value for the degree of freedom 19. So the calculated 't' value is significant at 0.05 level of significance. Result revealed that there is significant difference exists between pre test and post test of Speed. So the null hypothesis (H₀₄) "There would be no significant changes occur in Speed due to Interval Circuit Training Programme" is rejected.

10.5. Testing of H5

Table 1 shows that the mean of Speed for Continuous Circuit Training Group of pre test and post test are 8.14 and 7.61 and the standard deviations are .733 and .652 respectively. The calculated 't' value is 6.58 which is greater than that of critical 't' value for the degree of freedom 19. So the calculated 't' value is significant at 0.05 level of significance. Result revealed that there is significant difference exists between pre test and post test of Speed. So the null hypothesis (H₀₅) "There would be no significant changes occur in Speed due to Continuous Circuit Training programme" is rejected.

10.6. Testing of H6

Table 1 shows that the mean of Speed for Control Group of pre test and post test are 8.86 and 8.99 and the standard deviations are 1.28 and 1.42 respectively. The calculated 't' value is -.82 which is less than that of critical 't' value for the degree of freedom 19. So the calculated 't' value is not significant at 0.05 level of significance. Result revealed that there is no significant difference exists between pre test and post test of Speed. So the null hypothesis (H₀₆) "There would be no significant changes occur in Speed of Control Group" is Accepted.

10.7. Testing of H7

From Table-1, it was observed that the mean of CCT, ICT and CG groups were 11.52, 11.27 and 11.92 and the Std. Deviation 0.77, 0.56 and 0.66 in case of Agility. The researcher seen from Table-2, that the 'F' value for Agility 4.729 which was statistically significant at 0.05 and .01 level. Therefore, to find the exact location of difference for Agility Post Hoc test was used. From Table-3, the comparison of mean values of their different groups for Agility was computed through Post HOC Test (LSD test). The comparison between ICT and CG found significant statistically. The result was not significant at 0.05 level of confidence when the comparison was between CCT and ICT.

10.8. Testing of H8

From Table-1, it was observed that the mean of CCT, ICT and CG groups were 7.6110, 7.4535 and 8.9900 and the Std. Deviation .652, .642 and 1.427 in case of speed. The researcher seen from Table-2, that the 'F' value for Speed 14.901 which was statistically significant at 0.05 and .01 level. Therefore, to find the exact location of difference for speed Post Hoc test was used. From Table-3, the comparison of mean values of their different groups Speed was computed through Post HOC Test (LSD test). Comparison of ICT with CG and CCT with CG found significant but not significant when comparison between CCT and ICT was.

11. CONCLUSION

The results of the present study show that it is possible to develop both speed and agility by means of a twelve-week circuit training program. School students performing an extra-curricular circuit training program confirmed a significant improvement on both Agility and Speed (Annesi et al., 2005; Ignico and Mahon, 1995; Wong et al., 2008). Nevertheless, the design and the procedure of the present study depended on many aspects related to the school context. One of the main objectives of the researchers at this educational level is to make the pupils active as long as possible during the classes. With the circuits method the pupils can easily reach the minimum motor engagement time (Lozano et al., 2009) at the same time they execute many types of exercises. This is the best way to make the most of the time at a school teacher's disposal, especially when classes are few and short-lasting and there are many contents to develop (Ministerio de Educación y Ciencia, 2006). Thus, the present results indicate that the design proposed in this research could be effective for improvement of fitness in many ways as here in this study researcher confirmed some positive results of interval and continuous circuit training. On the basis of an elaborate discussion of the present research findings, now it may be concluded that interval and continuous circuit training have significant positive effect to enhance Physical fitness components speed and agility even after 12 weeks of training on secondary level school students. Physical Fitness can provide a healthy and useful life for each and every human being.

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