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EFFECT OF CIRCUIT TRAINING ON SELECTED PHYSICAL AND PHYSIOLOGICAL VARIABLES AMONG SCHOOL STUDENTS

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Abstract:-The purpose of the present study was to find out the effect of circuit training on selected physical and physiological variables among handball players. To achieve the purpose of the study thirty school students in an age group of 14 to 16 were selected as subjects. All the students were in the residential school staying in the hostel. 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 fitness program. In addition of the above training the experimental group underwent specified circuit training morning one hour before starting the their own routine physical education activities in a schedule of weekly three days in alternative days for all the eight weeks. The collected data's were statistically analyzed by using ANCOVA to find out the significant difference between the groups if any. It was concluded from the result of the study that the experimental group significantly improved in the selected physical fitness variables of speed, agility and explosive power and physiological variables of resting heart rate and breath holding time.

Keywords:physical fitness, speed, agility, explosive power, physiology,resting heart rate and breath holding time.

INTRODUCTION

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). It is an excellent training program for improving different type of physical fitness abilities based on the program in different stations. The program was developed by R.E. Morgan and G.T. Anderson in 1953 at the University of Leeds in England. Circuit training is a workout routine that combines cardiovascular fitness and resistance training. It was first proposed in the late 1950s as a method to develop general fitness. The initial routines were arranged in a circle, alternating between different muscle groups (hence the name circuit training). By allowing only a short rest interval of 30-90 seconds between stations, cardiovascular fitness is gained along with the benefits of resistance training. The different exercises in different stations are fixed depends on the trainees training state, age and demand to improve physical fitness and physiological qualities.

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 is undertaken to find out the effect of specified circuit training on certain physical and physiological variables. Circuit training has gained popularity as a training strategy due to its improvement in different physical fitness qualities. SudhakarBabu,M and Paul Kumar, P. P. S.(2013) 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. Manohar M. Mane and Sarvesh Kumar Yadav (2011) 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.Itwas found out the circuit training had benefited in improving all the selected physical fitness qualities.

Circuit training is one of the well-known training methods to improve the physical fitness and physiological efficiency due to its nature of the activity. The present study was intended to assess the effect of circuit training on the selected physical fitness and physiological qualities among school boys.

METHODOLOGY

To achieve the purpose of the study thirty school students in an age group of 14 to 16 were selected as subjects. All the students were in the residential school staying in the hostel. 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 physical education fitness program. In addition of the above training the experimental group underwent specified circuit training program morning one hour before starting the their own routine physical education activities in a schedule of weekly three days in alternative days for all the eight weeks.

Circuit training procedure

The eight weeks complex training was designed in emphasizes the necessity of the needs of fitness development of Scholl students with the age group of 14 to 16 years. The following combination of eight different exercises were designed in the circuit training program

1.Skipping
2.Push ups
3.Jumping jack
4.Step ups
5.Sit ups
6.Shuttle run
7.Squat jump and
8.sprint

The above circuit training was performed weekly three days in alternative days. Each exercise was carried out 3 to 5 repetitions. Rest intervals were 10 seconds between pairs and 3 to 4 minutes between sets for the duration of one hour.

Administration of tests

The pre and post tests were administered before and after the eight weeks training period. The test administered were physical fitness variables of speed (100 mts dash), agility (4x10 mts shuttle run) and explosive power (standing vertical jump) and physiological variables of resting heart rate and breathes holding time. All the tests were administered through standardized test.

Statistical Procedure

The collected data were statistically examined by analysis of covariance (ANCOVA) and the results have been presented in Table I to V.

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 I, II and III respectively.

Table-I: Computation of analysis of covariance on Speed

TEST	Group		sv	Sum of Squares	df	Mean Square	F value
	Exp.	Con.					
Pre test	15.02	14.87	B	0.065	1	0.065	0.154
			W	24.326	28	0.868	
Post test	14.11	14.68	B	1.352	1	1.352	4.422*
			W	18.136	28	0.647	
Adjusted Mean	14.13	14.70	B	1.642	1	1.642	10.465*
			W	6.008	27	0.2225	

*Significant at 0.05 level of confidence for the degree of freedom1 and 28 is 4.20 and df 1 and 27 is 4.21

It was observed from the Table-I that there was no significant difference in the pretest (F=0.154<4.20). A significant difference in the post test (F=4.422<4.20) for df 1 and 28 and adjusted posttest (F=10.465 > 4.21) for df 1 and 27 at 0.05 level of confidence. It clearly indicated that there was an influence on speed through circuit training among school boys.

The discussion clearly indicated that the experimental group was higher improvement on speed due to eight weeks circuit training.

Table-II: Computation of analysis of covariance on Agility

TEST	Group		sv	Sum of Squares	df	Mean Square	F value
	Exp.	Con.					
Pre test	13.865	12.580	B	*1.3024*	1	*1.3024*	1.459
			W	10.803	28	0.3858	
Post test	11.324	12.018	B	1.5448	1	1.5448	3.542
			W	8.5420	28	0.3050	
Adjusted Mean	12.675	12.33	B	0.765	1	0.765	6.452*
			W	4.8085	27	0.1780	

*Significant at 0.05 level of confidence for the degree of freedom1 and 28 is 4.20 anddf 1 and 27 is 4.21

It was observed from the Table-II that there were no significant difference in the pretest (F=1.459<4.20) and posttest (F=3.542<4.20) for df 1 and 28 at 0.05 level of confidence. However significant difference was observed on adjusted posttest (F=6.452 < 4.21) for df 1 and 27 at 0.05 level of confidence. It clearly indicated that there will not be any impact in agility due to circuit training among school boys.

The discussion clearly indicated that there was a significant difference in agility among experimental and control group due to eight weeks circuit training.

Table-III: Computation of analysis of covariance on Explosive power

TEST	Group		sv	Sum of Squares	df	Mean Square	F ratio
	Exp.	Con.					
Pre test	48.40	49.09	B	42.8642	1	42.8642	2.135
			W	854.372	28	30.5122	
Post test	51.54	50.51	B	398.52	1	398.52	6.132*
			W	868.486	28	31.1017	
Adjusted Mean	51.45	49.45	B	65.183	1	65.183	13.542*
			W	246.578	27	9.1325	

*Significant at 0.05 level of confidence for the degree of freedom1 and 28 is 4.20 and df 1 and 27 is 4.21

It was observed from the Table-III that there was no significant difference in the pretest (F=2.135<4.20) for df 1 and 28 at 0.05 level of confidence. But significant difference were observed in posttest (F=6.132<4.20) for df 1 and 28 at 0.05 level of confidence and also adjusted posttest (F=13.542 > 4.21) for df 1 and 27 at 0.05 level of confidence. It clearly indicated that

the experimental group showed significantly higher improvement on standing vertical jump than control group.

The discussion clearly indicated that the experimental group was higher improvement on explosive power due to eight weeks circuit training

Analysis of covariance of Physiological variables

The analysis of covariance on the data obtained for resting heart rate and breath holding time of pre and post tests were tabulated and presented in the tables IV and V

Table-IV: Computation of analysis of covariance on Resting Heart Rate

TEST	Group		sv	Sum of Squares	df	Mean Square	F ratio
	Exp.	Control					
Pre test	72.42	71.53	B	983.51	1	983.51	1.362
			W	743.675	28	26.5598	
Post test	69.3	71.23	B	531.213	1	531.213	5.604*
			W	546.128	28	19.504	
Adjusted Mean	70.23	71.56	B	37.452	1	37.452	10.458*
			W	79.498	27	2.9443	

*Significant at 0.05 level of confidence for the degree of freedom1 and 28 is 4.20 and df 1 and 27 is 4.21

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It was observed from the Table-IV that there was no significant difference in the pretest (F=1.362<4.20) and however significant difference were observed in the post test (F=5.604>4.20) for df 1 and 28 at 0.05 level of confidence and also adjusted posttest (F=10.458 > 4.21) for df 1 and 27 at 0.05 level of confidence. It clearly indicated that the experimental group showed significantly higher improvement on resting heart rate than control group.

The discussion clearly indicated that the eight weeks circuit training influence the resting heart rate.

Table-V: Computation of analysis of covariance on Breath Holding Time

TEST	Group		sv	Sum of Squares	df	Mean Square	F value
	Exp.	Con.					
Pre test	48.211	49.002	B	22.64	1	22.64	0.673
			W	2876.372	28	102.727	
Post test	55.481	51.35	B	268.62	1	268.62	2.672
			W	2594.56	28	92.662	
Adjusted Mean	53.246	50.09	B	203.43	1	203.43	6.475*
			W	760.36	27	28.161	

*Significant at 0.05 level of confidence for the degree of freedom1 and 28 is 4.20 and df 1 and 27 is 4.21.

It was observed from the Table-V that there were no significant difference in the pretest (F=0.673<4.20) and also in the post test (F=2.672<4.20) for df 1 and 28 at 0.05 level of confidence, however the training effect was clearly evident on adjusted posttest (F=6.475 > 4.21) for df 1 and 27 at 0.05 level of confidence. It clearly indicated that the experimental group showed significantly higher improvement on breath holding time than control group.

The discussion clearly indicated that the experimental group was higher improvement on breath holding time due to eight weeks circuit training.

CONCLUSIONS

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

1.Circuit training was proved a best training method to improve the physical fitnessqualities of speed, agility and explosive power.
2.Complex training was a best training method to improve the physiological efficiency. The selected physiological parameters of resting heart rate and breath holding time were significant effect through circuit training.
3.Circuit training may be included in physical fitness program of school students
4.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 in nature

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