RESEARCH ARTICLE

EXAMINING THE EFFECTS OF CIRCUIT AND INTERVAL TRAINING ON PHYSICAL FITNESS VARIABLES OF UNIVERSITY SPORTS SCIENCE STUDENTS

Dr. Tesfay Asgedom Haddera

Associate Professor, Department of Sports Science, College of Natural and Computational Sciences, Addis Ababa University, Addis Ababa, Ethiopia

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ABSTRACT

The purpose of the study was to examine the effects of circuit and interval training on physical fitness variables of sports science students. In the present pre-posttest study, 63, 3rd year students (age 21 to 23) of Sport Science department at Addis Ababa University were participated. They randomized in to three groups of circuit training (CT) (n=21), interval training (IT) (n=21) and control group (CG) (n=21). CT and IT groups underwent eight weeks of exercise trainings. Physical fitness variables like muscular endurance, power, flexibility, speed and agility were measured before and after the intervention. This study reported that, circuit and interval training have significance effect on muscle endurance, power, flexibility, speed and agility (p<0.000) in experimental groups and no significance difference was observed in CG. Furthermore, there is significant between the experimental groups and CG in all variables, however no significant difference was observed between circuit training and interval training group of 3rd year students was (p>0.05). Thus, both circuit and interval training methods may use for better improvement of physical fitness variables.

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1. INTRODUCTION

Physical fitness is most easily understood by examining these components, or elements, or parts i.e., (endurance, strength, speed, flexibility). Physical fitness is generally achieved through exercise, correct nutrition and enough rest. It is an important part of life. These days, physical fitness is considered a measure of the body's ability to function efficiently and effectively in work and leisure activities, to be healthy, to resist hypo kinetic diseases, and to meet emergency situations. The concept of training is reflected in words or terms, which are given to separate components of training (technique training, strength training) or separate methods of procedures of doing physical exercise (interval training and circuit training). Training means various physical exercises and their objective, methods and procedures, which are used for the improvement, maintenance and recovery of performance capacity and performance readiness. Thus, physical exercises are the physical means of training (Bompa, 1999).

Training adaptation is the sum of transformations brought about by systematically repeated exercises. These structural and physiological changes results from a specific demand that athletes place on their bodies by the activity they pursue depending on the volume, intensity and frequency of training. Physical training is beneficial as long as it forces the body to adapt to the stress of the effort (Bompa, 1999). 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). Interval training is the most versatile method of endurance training which involves repeated efforts art at a relatively faster pace, separated by measured intervals of incomplete recovery (Singh, 1991). Interval training in the sports field is a popular means of training that affects the physiological functioning of the body and brings the change in the synchronicity of the internal organic function which ultimately influences the performance and efficiency. Interval training consists of repetition runs over a specific distance, done in a set time, separated by recovery periods that are specified in terms of duration, distance, or both (i.e. it consists of alternating intervals of fast running and recovery). Training sessions will focus on specific race demands. It is a component of a balanced training program that will include recovery days and a range of other running activities, depending on the goals of the individual. A mix of

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interval training, a range of distances and types of runs (for example, hills, cross country) contribute to overall fitness and the capacity to engage in successful competitive running.

Taskin H, (2009) conduct a study to determine the effect of circuit training directed toward motion and action velocity over the sprint-agility and anaerobic endurance and reported that, circuit training, which is designed to be performed 3 days a week during 10 weeks of training, improves sprint-agility and anaerobic endurance. Velmurugan and Kalimuthu (2011) studied the effect of interval training on selected speed parameters such as speed. The criterion variable at prior to and immediately after the training program by using 50 mts run. The results of the study revealed that there was a significant difference between interval running group and control group on selected speed parameter. A significant improvement on selected criterion speed variable was also noticed due to interval running program. Furthermore, Buchheit et al., (2009), compared the effects of speed/agility (S/A) training with sprint interval training (SIT) on acceleration and repeated sprint ability (RSA) in well-trained male handball players. In well-trained handball players, 4 week of SIT is likely to have a moderate impact on intermittent endurance capacity only, whereas S/A training is likely to improve acceleration and repeated sprint performance. Fernandez et al., (2008), investigated the effects of high-intensity

interval training (HIIT) and repeated-sprint training (RST) on aerobic fitness, tennis-specific endurance, linear and repeated-sprint ability (RSA), and jumping ability. The authors reported, neither training strategy induced any effects on jumping and sprinting abilities. Both training interventions showed similar improvements in general aerobic fitness. Also, the study suggests that RST represents a time-efficient stimulus for a simultaneous improvement of general and tennis-specific aerobic fitness as well as for RSA.

Present study is undertaken to find out the effect of circuit and interval training on physical fitness variables of 3rd year students of Sport Science department at Addis Ababa University. There is no evidence of the most efficient and developed appropriate procedure for training athletes. Physical fitness training have various physical exercises and their objective, methods and procedures, which are used for the improvement, maintenance and recovery of performance capacity and performance readiness. Hence, it is considered appropriate by the researcher to conduct the study.

2. METHODOLOGY
Study area and program profile
The study was conducted in Addis Ababa City, the capital city of Ethiopia. The Sport Science department program is a multidisciplinary program being run by the College of Natural Science of Addis Ababa University, Addis Ababa, Ethiopia, since 2000. The program admits students from different sport science discipline in post and

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under graduate programs. The department has been accepting a maximum of 80 students every year only in undergraduate program.

Participants

This research was done on and with 3rd year students. The researcher selected 63 students who study football as elective course in their 3rd year program. The requirement of the project was explained to all the subjects and all of them agreed voluntarily to undergo the testing and training program. A thorough orientation of the rigid requirements of the experimental procedure testing as well as the exercise protocol was well explained to all the participants to calm uneasiness and written informed consent was obtained from them. So, there was no ambiguity of what effort was required on their part and what hardships they had to endure

Experimental design

As the purpose of the study was to investigate the effects of circuit training and interval training on 3rd year students, all the subjects of experimental groups were exposed to related standard tests to record the pretest data. The design of the experiment was planned in three phases. Phase –I (Pretest), Phase – II (Training or intervention) and Phase – III (Posttest). Before the pretests, students learn different physical fitness (speed, muscular endurance, strength, agility and flexibility) through the method of demonstration, and they have measured

their physical fitness. After the pretest, all the subject of experimental group underwent eight weeks training of interval and circuit training practices for 1 hour three days a week in the morning. Finally, when the intervention or training period of eight weeks was over, all the subjects were assessed or measured with the standard tests which were already performed in pretest.

Administration of the tests

Pretest and posttest physical fitness test variable measuring test were chosen as data collection instrument. These physical fitness tests were had five test batteries (Vertical jump, sit up, 30m dash run, Illinois agility test and bend and Reach. The researcher was collected all the information from the football students through test batteries and the information obtain through physical fitness tests were analyzed. The reliability of data, instrument and the test was ensured by, test retest method by using 20 subjects from each group and were assure by instrument reliability and tester competency. These five tests were measured twice by the same person under similar conditions.

Reliability of instrument

In this study, the researcher was measured performance of the students on fitness tests, by using different instrument, were used and the output was assessed to find out the reliability and validity of data. The data were therefore, consider reliable in this population. And regarding validity, researcher was systematically review the literature on that issue (Artero 2010).

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Research Scholar was put in maximum effort and meticulous care to have precision and accuracy in the measurements. Highly scientific instrument and standard procedures were used for administration of test. Thus, sit-ups was used to measure abdominal strength and endurance, standing broad jump was used to measure explosive power of leg, 30 meters dash (speed test) was used measure speed of the students, bench and reach was used to measure flexibility and Illinois (agility test) was used to measure the agility of the subjects.

Training protocol

ACSM (1995) recommended that clients beginning an exercise program should perform 3 days per week on nonconsecutive days. Duration of training: 20–60 min of continuous or intermittent activities dependent on the intensity of the activity; thus, lower-intensity activity should be conducted over a longer period of time (30 min or more), and, conversely, individuals training at higher levels of intensity should train at least 20 min or longer. Moderate duration recommended (20-30min) excluding spent of warming up and cool down (ACSM 1995). Circuit training and interval training was conducted on the field in different days. 10 - 15 min for warming up activity for each, and 20 - 40 min for physical training. After warming up, the subjects would instruct to perform the selected physical exercises. After exercise program proper cool down would be performed. The subjects underwent their respective training programs as per schedules under the supervision of the researchers. The study was included pre- and post- test measurements on either side of the 8-week training program. The subjects were requested to refrain from eating, drinking or doing any strenuous physical work at least for 2 hours before the onset of experiment. Training program for circuit training group was Monday, Wednesday and Friday morning, whereas, it was Tuesday, Thursday and Saturday morning for interval training.

Statistical techniques

The data collected on the selected physiological variables in pre and post-test were analyzed, interpreted and tabulated into a meaningful way by using computerized software analyses were performed using IBM-SPSS version 20 (IBM, Armonk, NY, United states of America) Descriptive statistics was applied to process the data prior to employing inferential statistics. Analysis of covariance (ANCOVA) was applied to found out the significant difference if any, among the experimental groups and control group on selected criterion variables separately. Further Schiff post-hoc test would be applied if significant difference exists. Level of significance would be set at 0.05.

3. RESULTS

The mean and standard deviation scores of pretest, posttest and adjusted posttest of all variables on circuit training, interval training and control group are given in table 1. 'F' ratio test computed in regards to the variables on circuit training, interval training and control group in the pretest, posttest and adjusted posttest are also presented for each variable in the preceding section.

Table 1. Mean and standard deviation results of the groups.

Groups	Test	N	Muscular Endurance	Power	Flexibility	Speed	Agility
			Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD
CT	Pre	21	30.00$\pm$3.89	1.71$\pm$.422	6.24$\pm$6.00	4.21$\pm$.33	12.23$\pm$.48
	Post	21	41.23$\pm$3.70	2.13$\pm$.14	12.65$\pm$5.47	3.87$\pm$.20	11.68$\pm$.45
IT	Pre	21	23.14$\pm$4.88	2.10$\pm$.09	8.41$\pm$5.96	4.10$\pm$.24	13.39$\pm$.96
	Post	21	38.19$\pm$3.90	2.17$\pm$.11	13.39$\pm$4.24	3.90$\pm$.22	11.86$\pm$.61
CG	Pre	21	23.66$\pm$5.32	2.06$\pm$.25	11.53$\pm$6.61	4.29$\pm$.38	13.45$\pm$.88
	Post	21	21.28$\pm$3.39	2.05$\pm$.24	10.90$\pm$4.37	4.48$\pm$.24	13.88$\pm$.63

CT= Circuit training group, IT= Interval Training group, CG= control group,

Results on Muscular Endurance

Table 2 shows that, the muscular endurance pre means were 30.0000 for the circuit training group, 23.1429 for interval training group and 23.6667 for the control group. The obtained F ratio value for pre test, mean was 13.624 which were greater than the required table value of 3.150 for significant at 0.05 level of confidence with the degrees of freedom 2 and 60. This proved that there was a significant difference among the groups at initial stage.

The posttest means were 41.2381 for the circuit training group, 38.1905 for interval training group and 21.2857 for the control group. The resultant 'F' ratio value for post test mean was 179.855 which were greater than the required table value of 3.150 at 0.05 level of confidence with the degrees of freedom 2 and 60. This proved that the differences among the post test means of the subject were significant.

The obtained F ratio value for adjusted test mean was 198.239 which were greater than the table value of 3.191 for significant at 0.05 level of confidence with the degrees of freedom 2 and 59. The results of the study indicate that there is a significant difference among circuit training, interval training and control groups on the muscular endurance. To determine which of the paired means had a significant difference, Scheffe's post-hoc test was applied and the results are presented.

Table 2. Between group comparisons of muscular endurance

Tests	Group Mean Results			SoV	SS	df	MSS	F-ratio	sig
	Circuit	interval	Control						
Pre	30.0000	23.1429	23.6667	A	611.841	2	305.921	13.624*	.000
				W	1347.238	60	22.454		
	3.89872	4.88145	5.32291	Total	1959.079	62			
Post	41.2381	38.1905	21.2857	A	4852.095	2	2426.048	179.855*	.000
	3.70006	3.90665	3.39327	W	809.333	60	13.489		
				Total	5661.429	62			
Adjusted Post test	39.422	39.207	22.086	A	3894.362	2	1947.181	198.239*	.000
				W	579.520	59	9.822		

Table F-ratio at 0.05 level of confidence for 2 and 60(df) =3.150 and 2 and 59(df)=3.191

Table –3 shows that the Scheffẽ S test on muscular endurance for the difference between adjusted post-test mean of circuit training group and interval training group (0.216) which was no significance difference at 0.05 level of confidence but the mean difference of circuit training group and control group (17.337), and interval training group and control group (17.121) which were significant at .05 level of confidence. There was no significant difference between circuit training and interval training groups and both groups was found to be significantly better than control group in increasing muscular strength of the subjects.

Table 3. Scheffe's Post Hoc Test on Muscular endurance among three groups

Circuit	Interval	Control	Md	Confidence Interval Value
39.422	39.207		0.216	1.000
39.422		22.086	17.337*	.000
	39.207	22.086	17.121*	.000

Results on Power
The mean scores of pretest, posttest and adjusted posttest of power on circuit training, interval training and control

group are given in table 4. 'F'ratio test computed in regards to the power on circuit training, interval training and control group in the pretest, posttest and adjusted post test are also presented in table.

Table 4 the above table shows the power pre means were 1.7133 for the circuit training group, 2.1000 for interval training group and 2.0662 for the control group. The obtained F ratio value for pretest mean was 11.510 which were greater than the required table value of 3.150 for significant at 0.05 level of confidence with the degrees of freedom 2 and 60. This proved that there was a significant difference among the three groups at initial stage.

The posttest means were 2.1319 for the circuit training group, 2.1771 for interval training group and 2.0510 for the control group. The resultant 'F' ratio value for post test mean was 2.728 which was less than the required table value of 3.150 at 0.05 level of confidence with the degrees of freedom 2 and 60. This proved that the differences among the posttest means of the subject were insignificant.

The obtained F ratio value for adjusted test mean was 8.615 which were greater than the table value of 3.191 for significant at 0.05 level of confidence with the degrees of freedom 2 and 59. The results of the study indicate that there is a significant difference among circuit training, interval training and control groups on the power. To determine which of the paired means had a significant difference, Scheffe's post-hoc test was applied and the results are presented.

Table 4. Between group comparisons of Power

Tests	Group Mean Results			SoV	SS	Df	MSS	F-ratio
	Circuit	**interval**	**Control**	**SoV**	**SS**	**Df**	**MSS**	**F-ratio**
Pre	1.7133	2.1000	2.0662	**A**	1.926	2	.963	11.510*
				W	5.020	60	.084	
	.42200	.09726	.25194	**Total**	6.946	62		
Post	2.1319	2.1771	2.0510	**A**	.172	2	.086	2.728
	.14566	.11389	.24533	**W**	1.888	60	.031	
				Total	2.059	62		
Adjusted Post test	2.219	2.128	2.013	**A**	.369	2	.184	8.615*
				W	1.263	59	.021	

Table F-ratio at 0.05 level of confident for 2 and 60(df) =3.150 and 2 and 59(df) =3.191.

Table – 5 shows that the Scheffẽ S test on explosive strength for the difference between adjusted post-test mean of circuit training group and interval training group(0.091) were insignificant at .05 level of confidence, but circuit training group and control group (0.205),and interval training group and control group(0.114) which were significant at 0.05 level of confidence.

Table 5. Scheffe's Post Hoc Test on Power among three groups

Circuit	Interval	Control	Mean Differences	Confidence Interval Value
2.219	2.128		0.091	0.250
2.219		2.013	0.205*	0.000
	2.128	2.013	0.114*	0.043

Results on Flexibility

The mean scores of pretest, posttest and adjusted posttest of flexibility on circuit training, interval training and control group are given in table 6. 'F' ratio test computed in regards to the flexibility on circuit training, interval training and control group in the pretest, posttest and adjusted post test are also presented in table.

Table 6 shows the flexibility pre means were 6.2452 for the circuit training group, 8.4143 for interval training group and 11.5333 for the control group. The obtained F ratio   value for pretest mean was 3.858 which were greater than the required table value of 3.150 for significant at 0.05 level of confidence with the degrees of freedom 2 and 60. This proved that there was a significant difference among the three groups at initial stage.

The posttest means were 12.6590 for the circuit training group, 13.3905for interval training group and 10.9010 for the control group. The resultant 'F' ratio value for post test mean was 1.537 which was less than the required table value of 3.150 at 0.05 level of confidence with the degrees of freedom 2 and 60. This proved that the differences among the posttest means of the subjects were insignificant.

The obtained F ratio value for adjusted test mean was 12.045 which were greater than the table value of 3.191 for significant at 0.05 level of confidence with the degrees of freedom 2 and 59. The results of the study indicate that there is a significant difference among circuit training, interval training and control groups on the flexibility. To determine which of the paired means had a significant difference, Scheffe's post-hoc test was applied and the results are presented**.**

Table 6. Between group comparisons of flexibility

Tests	Group Mean Results			SoV	SS	df	MSS	F-ratio
	Circuit	Interval	Control					
Pre	6.2452	8.4143	11.5333	A	296.780	2	148.390	3.858*
				W	2307.662	60	38.461	
	6.00670	5.96257	6.61440	Total	2604.442	62		
Post	12.6590	13.3905	10.9010	A	68.765	2	34.383	1.537
	5.47440	4.24122	4.37790	W	1342.459	60	22.374	
				Total	1411.224	62		
Adjusted Post test	14.048	13.567	9.335	A	253.726	2	126.863	12.045*
				W	621.431	59	10.533	

Table F-ratio at 0.05 level of confident for 2 and 60 (df) =3.150 and 2 and 59(df) =3.191

Table 7 shows that the Scheffẽ S test on flexibility for the difference between adjusted post-test mean of circuit training group and interval training group(0.481) were insignificant at .05 level of confidence, but circuit training group and control group (4.714),and interval training group and control group(4.233) which were significant at .05 level of confidence. Therefore circuit training and interval training groups was found to be significantly better in increasing flexibility of the subjects.

Table 7. Scheffe's Post Hoc Test on Muscular endurance among three groups

Circuit	Interval	Control	Mean Differences	Confidence Interval Value
14.048	13.567		0.481	1.000
14.048		9.335	4.714*	0.000
	13.567	9.335	4.233*	0.000

Results on Speed

The mean scores of pretest, posttest and adjusted posttest of speed on circuit

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training, interval training and control group are given in table 8. 'F'ratio test computed in regards to the speed on circuit training, interval training and control group in the pretest, posttest and adjusted post test are also presented in table. Table 8 shows the speed pre means were 4.2190 for the circuit training group, 4.1000 for interval training group and 4.2905 for the control group. The obtained F ratio value for pretest mean was 1.820 which was less than the required table value of 3.150 for significant at 0.05 level of confidence with the degrees of freedom2and60.This proved that there was no significant difference among the three groups at initial stage.

The post test means were 3.8714 for the circuit training group, 3.9048 for interval

training group and 4.4810 for the control group. The resultant 'F' ratio value for post test mean was 48.282 which were greater than the required table value of 3.150 t0.05levelofconfidencewiththedegreesof freedom 2 and 60. This proved that the differences among the posttest means of the subject were significant.

The obtained F ratio value for adjusted test mean was 50.091 which were greater than the table value of 3.191 for significant at 0.05 level of confidence with the degrees of freedom 2 and 59. The results of the study indicate that there is a significant difference among circuit training, interval training and control groups on the speed. To determine which of the paired means had a significant difference, Scheffe's post-hoc test was applied and the results are presented.

Table 8. Between group comparisons of Speed

Tests	Mean & Standard Deviation							
	Circuit	interval	Control	SoV	SS	Df	MSS	F-ratio
Pre	4.2190	4.1000	4.2905	A	.389	2	.194	1.820
				W	6.410	60	.107	
	.33109	.24698	.38718	Total	6.799	62		
Post	3.8714	3.9048	4.4810	A	4.932	2	2.466	48.282*
	.20529	.22688	.24417	W	3.065	60	.051	
				Total	7.997	62		
Adjusted Post test	3.867	3.936	4.455	A	4.209	2	2.105	50.091*
				W	2.479	59	.042	

Table 10 shows that, F-ratio at 0.05 level of confident for 2 and 60(df) =3.150 and 2 and 59 (df) =3.191

Table – 9 shows that the Scheffẽ S test on speed for the difference between

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adjusted post-test mean of circuit training group and interval training group(0.069) were no significant at .05 level of confidence, but circuit training group and control group (0.588),and interval training group and control group(0.519) which were significant at .05 level of confidence.

Table 9. Scheffe's Post Hoc Test on Speed among three groups

Circuit	Interval	Control	Mean Differences	Confidence Interval Value
3.867	3.936		0.069	0.849
3.867		4.455	0.588*	0.000
	3.936	4.455	0.519*	0.000

Result on Agility

The mean scores of pretest, posttest and adjusted posttest of agility on circuit training, interval training and control group are given in table 10. 'F'ratio test computed in regards to the agility on circuit training, interval training and control group in the pretest, posttest and adjusted post test are also presented in table. Table 10 shows the agility pre means were 12.2333 for the circuit training group, 13.3905 for interval training group and 13.4524 for the control group. The obtained F ratio value for pretest mean was 15.273 which were greater than the required table value of 3.150 for significant at 0.05 level of confidence with the degrees of freedom 2 and 60. This proved that there was significant difference among the three groups at initial stage.

The posttest means were 11.6862 for the circuit training group, 11.8667 for interval training group and 13.8810 for the control group. The resultant 'F' ratio value for post test mean was 93.940 which were greater than the required table value of 3.150 at 0.05 level of confidence with the degrees of freedom 2 and 60. This proved that the differences among the posttest means of the subject were significant.

The obtained F ratio value for adjusted test mean was 87.286 which were greater than the table value of 3.191 for significant at 0.05 level of confidence with the degrees of freedom2and59. The results of the study indicate that there is a significant difference among circuit training, interval training and control groups on the agility. To determine which of the paired means had a significant difference, Scheffe's post-hoc test was applied and the results are presented.

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Table 10. Between group comparisons of agility

Tests	Group Mean Results							
	Circuit	interval	Control	SoV	SS	df	MSS	F-ratio
Pre	12.2333	13.3905	13.4524	A	19.802	2	9.901	15.273*
	.48097	.96794	.88126	W	38.897	60	.648	
				Total	58.699	62		
Post	11.6862	11.8667	13.8810	A	62.348	2	31.174	93.940*
	.45783	**4.5. .61671**	.63688	W	19.911	60	.332	
				Total	82.259	62		
Adjusted Post test	11.939	11.750	13.745	A	47.227	2	23.614	87.286*
				W	15.961	59	.271	

Table F-ratio at 0.05 level of confident for 2 and 60 (df) = 3.150 and 2 and 59(df)=3.191

Table – 11 shows that the Scheffĕ S test on agility for the difference between adjusted post-test mean of circuit training group and interval training group(0.188)which was not significance at0.05 level of confidence but circuit training group and control group (1.806),and interval training group and control group(1.995) which were significant at .05 level of confidence.

Table 11. Scheffe's Post Hoc Test on agility among three groups

Circuit	Interval	Control	Mean Differences	Confidence Interval Value
11.939	11.750		0.188	0.885
11.939		13.745	1.806*	0.000
	11.750	13.745	1.995*	0.000

4. DISCUSSION

The purpose of this study was to investigate the effects of circuit and interval training on selected physical fitness variables of 3rd year students of sport science department, allowing them to participate in three groups for eight weeks. For this purpose 63 students (age 21 to 23) were participated in this study. This study reported that, circuit training has significance effect on muscle endurance, power, flexibility, speed and agility and no significance difference between circuit training and interval training group of 3rd year students was observed at 0.05 level of confidence. Similarly, interval training has appositive effects on selected physical fitness variables namely muscular endurance, power, flexibility, speed and agility among 3rd year sport science student at 0.05 level of confidence. The result of the study shows that the control

group has not shown a positive effect on selected physical fitness of 3rd year

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students. Furthermore, both circuit and interval training methods shows a better improvement on selected physical fitness variables of 3rd year students at 0.05 level of confidence.

The results of the present study show that it is possible to develop muscular endurance by means of eight week circuit training and interval training program intervention. Results on muscular strength hint the advancement of the circuit training and the interval group than control group. This finding is in agreement with a study by Taskin H, (2009). The result of the study shows that there was a significant improvement take place on muscular endurance due to eight weeks physical exercise training program. The results of the study showed that circuit training and interval training groups haven't significantly differed on muscular endurance improvement, but between the training groups no significant difference was found. Hence it was concluded that circuit training and interval training was better method than control group to increase the muscular endurance (Uma et al., 2011). The analysis of the present study shows that due to eight weeks treatment the circuit training group and interval training group improved power than control group and the differences were insignificant at 0.05 levels between the experimental groups. This is in agreement with (Fernandez et al., 2008). Results on both means hint the

improving power. The result of the study shows that there was a significant improvement take place on power due to eight weeks physical exercise training program.

The physical fitness variable, flexibility was the range of motion available at a joint (Fitness, 2005). It was measured through bend reach test. If you want to improve your flexibility, try activities that lengthen the muscles such as swimming or a basic stretching program. The results of the present study show that it is possible to develop flexibility by means of eight week circuit training and interval training program intervention. The post hoc analysis through Scheffe's confidence test proved that due to eight weeks treatment the circuit training group and interval training group improved flexibility than control group and the differences were insignificant at 0.05 levels between the experimental group. Results on both means hint the advancement of both circuit training and interval training group are better in improving flexibility. The result of the study shows that there was a significant improvement take place on flexibility due to eight weeks physical exercise training program.

The physical fitness variable, speed was measured through 30meter dash test. The result of the present study shows that it is possible to develop speed by means of eight week circuit training and interval training program intervention. The post hoc analysis through Scheffe's confidence test proved that due to eight weeks treatment

advancement of both circuit training and interval training group are better in

the circuit training group and interval training group improved speed than control group

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and the difference were insignificant at 0.05 levels between the experimental groups. Results on both means hint the advancement of both circuit training and interval training group are better in improving speed. The speed was decreased due to the progressive training program they were engaged in. The result of the study shows that there was a significant improvement take place on speed due to eight weeks circuit and interval training.

The physical fitness variable, agility was measured through illion's test in second. The result of the present study shows that it is possible to develop agility by means of eight week circuit training and interval training program intervention (Taskin H, 2009). The post hoc analysis through Scheffe's confidence test proved due to eight weeks treatment the circuit training group and interval training improved agility better than control group and the differences were in significant at 0.05 levels of confidence between the experimental groups. The agility time was decreased due to the progressive training program they were engaged in. The result of the study shows that there was a significant improvement take place on agility due to eight weeks physical exercise training program.

CONCLUSION

Both circuit and interval training methods may use for better improvement of physical fitness variables. Circuit and interval training have significance effect on muscle

endurance, power, flexibility, speed and agility and no significance difference

between circuit training and interval training group. The researcher recommended that, physical education teachers, fitness trainers and coaches should incorporate these training methods for performance enhancement and future researchers should extended the training program from 12 to 15 weeks for a better performance improvement and select more physical fitness variables with more different tests.

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