



Efficacy of Different Intensity Circuit Training and Detraining on Vital Index

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Abstract

The purpose of the study was to find out the effect of different intensity circuit training and detraining on selected physiological parameter (Vital index). To achieve the purpose of the study, 45 untrained male students from the Department of Physical Education and Sports Sciences, Annamalai University were selected randomly as subjects from volunteers, in the age group of 18 to 20 years. The chosen subjects were randomly assigned into three groups of 15 each. Group I underwent moderate intensity circuit training, group II followed high intensity circuit training and group III acted as control subjects. The intensity of exercise was progressively increased once in two weeks. After the completion of ten weeks of moderate and high intensity circuit training periods, the subjects of both experimental groups were physically detrained for 40 days. During the detraining period both the experimental groups were ceased their circuit training and became inactive. They have not participated in circuit training or in any other strenuous physical exercise throughout the detraining period and they were under the control of the investigator. During the 40 days of detraining period, the data were collected for all the variables, once in ten days for four detraining periods for both experimental groups and control group. Both experimental groups have significantly increased the vital index as compared to control group. Further, the improvement of vital index is significantly higher for high intensity group than moderate intensity circuit training group. During detraining period, the gradual decline of vital index for moderate intensity group is similar to high intensity group. However, there is no significant difference between experimental groups during all the cessation periods.

Keywords: Circuit Training, Detraining, Vital Index.

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Introduction

In today's age of scientific knowledge, man is making rapid progress in all walks of life and it is true in the area of games and sports. Also scientific knowledge has revolutionised the standards of human performance in sports disciplines. The athletes are now trained on scientific lines and using highly sophisticated technology for top performance in their specific sports to get optimum performance with minimum expenditure of energy and time (Tanner, 1965). Fitness is the ability to live a full and balanced life. Greater the physical fitness the better the physical endurance and precision of movement will be, which are essential for our daily work of life. The improvement and maintenance of physical fitness or condition is perhaps the most important aim of sports training. Each person requires a different type and level of physical condition and as a result different type of fitness training or conditioning is required for different people.

Methodology

The experimental design used for the present

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study was random group design involving 45 volunteers as subjects. This study consisted of two experimental variables such as moderate intensity and high intensity circuit training.

Among the three groups, group I was treated with moderate intensity circuit training; group II was followed high intensity circuit training and group III acted as control group. Each group consists of 15 subjects and they were tested prior and after ten weeks of circuit training. During the 40 days of detraining period, four tests were conducted at the interval of 10 days for both experimental and control groups. During each testing period all the criterion variables physiological parameters (VITAL INDEX) variables were tested. For the detraining effect 3 x 5 factorial design with the last factor repeated measures was used. The first factor denotes two experimental groups and control group, and the second factor indicates five testing periods namely post-test and four tests during detraining period. To examine the effect of moderate and high intensity circuit training on motor abilities, physiological parameters and biochemical variables, analysis of covariance (ANCOVA) was computed (Clarke & Clarke, 1972) for the data collected from moderate intensity, high intensity and control groups during pretest and posttest separately for each variable. Further, since three groups were involved, whenever the F ratio was significant, Scheffe's

post hoc test was used to determine which of the paired mean differed significantly. In order to explore the influence of detraining on chosen variables, the data collected from both experimental groups and control group during post test and during four stages of detraining were analysed by calculating two way 3 x 5 factorial ANOVA with last factor repeated measures separately for each variables. When the interaction (groups and testing periods) was significant, the simple effect test (Rothstein, 1985) was used as a follow up test. Whenever simple effect test showed significant difference, Scheffe’s test was applied as post hoc test to

find out which of the paired means showed significant difference. In determining the level of significance 0.05 was fixed.

Analysis of Vital Index Training Effect

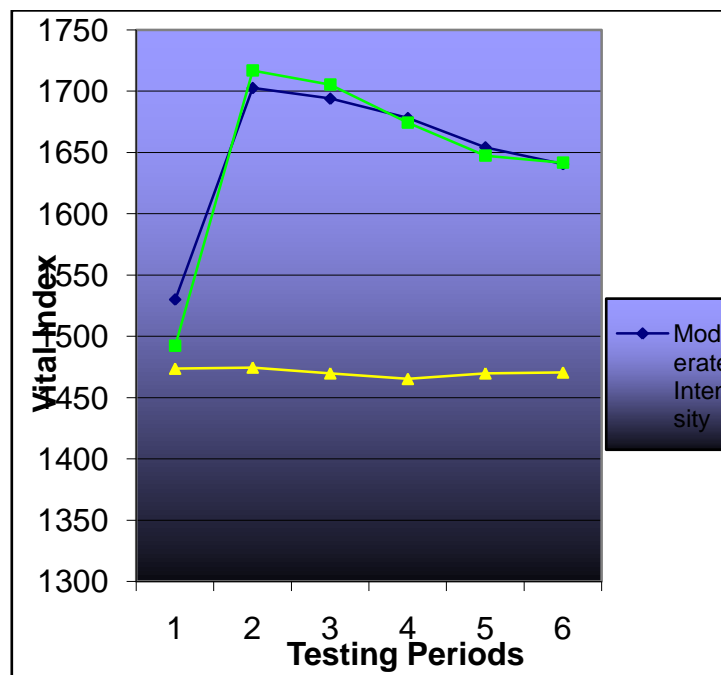
The mean and standard deviation values on vital index of moderate intensity circuit training group, high intensity circuit training group and control group during six different testing periods have been presented in table I.

Table I. Mean and Standard Deviation on Vital Index of Pretest, Posttest and Four Cessations Data of Experimental and Control Groups

Groups		Pre Test	Post Test	First Cessation	Second Cessation	Third Cessation	Fourth Cessation
Moderate Intensity Circuit Training Group	Mean	1529.88	1702.65	1693.92	1678.07	1654.17	1640.48
	SD	127.61	137.88	142.20	139.95	132.32	132.30
High Intensity Circuit Training Group	Mean	1492.27	1716.90	1705.38	1674.38	1647.36	1641.75
	SD	99.04	84.85	84.46	80.08	77.25	82.76
Control Group	Mean	1473.57	1474.49	1469.75	1465.20	1469.73	1470.45
	SD	105.13	82.63	84.89	85.73	81.21	74.69

The details of vital index during six testing periods among three groups are graphically illustrated in figure 1.

Figure I. Graphical Representation of Pretest, Posttest and Four Cessations Data of Moderate Intensity, High Intensity and Control Groups on Vital Index



The analysis of covariance for the pre and post-tests data on vital index of experimental and control

groups have been analysed and presented in table III.

Table III. Analysis of Covariance for Pre and Post Tests Data on Vital Index of Experimental and Control Groups

Group Test	Moderate Intensity Circuit Training	High Intensity Circuit Training	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	'F' Ratio
Pretest Mean	1529.87	1492.27	1473.57	Between	24665.3	2	12332.6	1.00
	SD	127.61	99.04	105.13	Within	520060	42	
Posttest Mean	1702.65	1716.90	1474.49	Between	555099.2	2	277549	25.20*
	SD	137.87	84.85	82.63	Within	462544.4	42	
Adjusted Posttest Mean	1675.85	1722.30	1495.91	Between	421632	2	210816	106.49*
				Within	81164.77	41	1979.62	

* Significant at 0.05 level.

The table value required for significance at 0.05 level of confidence with degrees of freedom 2, 41 is 3.23 and degree of freedom 2, 42 is 3.22.

Table III shows that the obtained 'F' ratio value of 1.00 for pretest mean on vital index is not significant. It reveals that there is statistically no significant difference among experimental and control groups on vital index before the commencement of circuit training. The 'F' ratio value of 25.20 for post-test data on vital

index is significant at 0.05 level. The 'F' ratio value of 106.49 for adjusted post-test on vital index is significant at 0.05 level. It reveals that there is significant difference among the groups on vital index as a result of circuit training. The result of Scheffe's post-hoc test is presented in table IV.

Table IV. Scheffe's Test for the Differences between the Adjusted Post Test Paired Means on Vital Index of Experimental and Control Groups

Adjusted Post Test Mean			Mean Differences	Level of Significance
Moderate Intensity Circuit Training Group	High Intensity Circuit Training Group	Control Group		
1675.85	1722.30		46.45	0.05
1675.85		1495.91	179.94	0.05
	1722.30	1495.91	226.39	0.05

The confidence interval required for 0.05 level of significance is 41.27.

Table IV shows that all the three-paired means are significant at 0.05 level. It reveals that both experimental groups have significantly increased the vital index as compared to control group. Further, the improvement of vital index is significantly higher for high intensity group than moderate intensity circuit

training group.

Influence of Detraining

The data on vital index have been analysed by two-way factorial ANOVA (3 x 5) with repeated measures on last factor and the results are presented in table V.

Table V. Analysis of Variance on Vital Index of Experimental and Control Groups at Five Different Testing Periods

Source of Variance	Sum of Squares	df	Mean Squares	“F” Ratio
Rows (Groups)	2113596.4	2	1056798.2	19.98*
Error	2220690.1	42	52873.57	
Columns (Testing Periods)	73985.32	4	18496.33	94.83*
Interaction (Groups X Testing Periods)	35808.34	8	4476.04	22.95*
Error	32765.89	168	195.04	

*Significant at .05 level

Table values required for significance at 0.05 level with df 2, 42; 4, 168 and 8, 168 are 3.22, 2.42 and 1.99 respectively.

From the table V it is clear that the obtained ‘F’ ratio for groups, 19.98 is significant at 0.05 level. It is evident that the influence of detraining on vital index among moderate intensity, high intensity and control groups differ significantly. Table V also shows that the obtained ‘F’ ratio for testing periods, 94.83 is significant at 0.05 level. It is found that the declines of vital index during different testing periods differ significantly. From

the table V it is evident that the obtained ‘F’ ratio for the interaction between groups and testing periods is 22.95 is also significant at 0.05 level. The finding of the study implies that significant differences exist for the reduction on vital index among three groups and five testing periods. Since, the interaction is significant, the simple effect test was applied as follow-up test and which is presented in table VI.

Table VI. Simple Effect Scores on Vital Index for the Interaction among Three Groups during Five Testing Periods

Source of Variance	Sum of Squares	df	Mean Squares	“F” Ratio
Groups and Post Test	555113.3	2	277556.6	1423.075*
Groups and First Cessation	529525.1	2	264762.5	1357.478*
Groups and Second Cessation	445417.6	2	222708.8	1141.862*
Groups and Third Cessation	328084.5	2	164042.3	841.070*
Groups and Fourth Cessation	291277.5	2	145638.8	746.713*
Testing Periods and Group I	41263.68	4	10315.92	52.891*
Testing Periods and Group II	67879.08	4	16969.77	87.007*
Testing Periods and Group III	652.64	4	163.16	0.837
Error	32765.89	168	195.04	

*Significant at 0.05 level.

Table values required for significance at 0.05 level with df 2, 168 and 4, 168 are 3.05 and 2.42 respectively.

Table VI shows that the changes on vital index during all the five testing periods differ significantly at 0.05 level. Table VI also reveals that the changes on vital index for both experimental groups differ significantly at 0.05 level, during different testing periods. Since, the

changes on vital index is significant during testing periods and among groups, Scheffe’s post-hoc test was applied separately to find out the paired mean differences, if any. The results of Scheffe’s test for testing period is given in table VII.

Table VII. Scheffe’s Test for the differences between the Paired Means of Post Test and Cessation Periods for Different Groups on Vital Index

Testing Periods	Moderate Intensity Circuit Training Group	High Intensity Circuit Training Group	Control Group	Mean Difference
Post Test	1702.65	1716.90		14.25*
	1702.65		1474.49	228.16*
		1716.90	1474.49	242.41*
First Cessation	1693.92	1705.38		11.46
	1693.92		1469.75	224.17*
		1705.38	1469.75	235.63*
Second Cessation	1678.07	1674.38		3.69
	1678.07		1465.20	212.87*
		1674.38	1465.20	209.18*
Third Cessation	1654.17	1647.36		6.81
	1654.17		1469.73	184.44*
		1647.36	1469.73	177.63*
Fourth Cessation	1640.48	1641.75		1.27
	1640.48		1470.45	170.03*
		1641.75	1470.45	171.30*

* Significant at 0.05 level.

The confidence interval required for significant at 0.05 level is 12.60.

It is clear from table VII that the changes on vital index during each testing periods differ significantly at 0.05 level. The result of the study reveals that during detraining period, the gradual decline of vital index for moderate intensity group is similar to high intensity

group. However, there is no significant difference between experimental groups during all the cessation periods. The results of Scheffe’s test for the moderate intensity circuit training group is presented in table VII.

Table VII. Scheffe’s Test for the differences among Paired Means of Moderate Intensity Circuit Training Group during different Testing Periods on Vital Index

Post Test	First Cessation	Second Cessation	Third Cessation	Fourth Cessation	Mean Difference
1702.65	1693.92				8.73
1702.65		1678.07			24.58*
1702.65			1654.17		48.48*
1702.65				1640.48	62.17*
	1693.92	1678.07			15.85
	1693.92		1654.17		39.75*
	1693.92			1640.48	53.44*
		1678.07	1654.17		23.90*
		1678.07		1640.48	37.59*
			1654.17	1640.48	13.69

* Significant at .05 level.

The confidence interval required for significance at 0.05 level is 15.88.

Table VII shows that the changes on vital index of moderate intensity circuit training group differ significantly at 0.05 level for the paired means of post-test with second, third and fourth cessations; first cessation with third and fourth cessations; & second cessation with third and fourth cessations. Rest of the

paired means didn’t differ significantly. The vital index of moderate intensity circuit training group declined significantly during third cessation. The results of Scheffe’s test for the high intensity circuit training group is presented in table IX.

Table IX. Scheffe’s Test for the differences among Paired Means of High Intensity Circuit Training Group during different Testing Periods on Vital Index

Post Test	First Cessation	Second Cessation	Third Cessation	Fourth Cessation	Mean Difference
1716.90	1705.38				11.52
1716.90		1674.38			42.52*
1716.90			1647.36		69.54*
1716.90				1641.75	75.15*
	1705.38	1674.38			31.00*
	1705.38		1647.36		58.02*
	1705.38			1641.75	63.63*
		1674.38	1647.36		27.02*
		1674.38		1641.75	32.63*
			1647.36	1641.75	5.61

* Significant at .05 level.

The confidence interval required for significance at 0.05 level is 15.88.

With regard to the changes on vital index, the trend observed for the moderate intensity group is also reflected for the high intensity group. During detraining period the decline on vital index for high intensity circuit training group was significant during second and third cessation. The maximum rate of deterioration has occurred during second cessation.

Discussion

Both experimental groups have significantly increased the vital index as compared to control group. Further, the improvement of vital index is significantly higher for high intensity group than moderate intensity circuit training group. The vital index of moderate intensity circuit training group declined significantly during third cessation. During detraining period the decline on vital index for high intensity circuit training group was significant during second and third cessation. The maximum rate of deterioration has occurred during second cessation. During detraining period, the gradual decline of vital index for moderate intensity group is similar to high intensity group. However, there is no significant difference between experimental groups during all the cessation periods.

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