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Influence of different intensities of circuit trainings on selected physical fitness parameters

P Naveenkumar[1], Dr. P Karthikeyan[2]
[1] Scholar, Department of Physical Education, Annamalai University, Tamil Nadu, India
[2] Associate Professor, Department of Physical Education, Annamalai University, Tamil Nadu, India

Abstract
The purpose of the study was to find out the effects of different intensities of circuit trainings on selected physical fitness parameters such as leg strength and strength endurance. To achieve this purpose of the study, forty-five men students studying bachelor's degree in the Department of Physical Education, Annamalai University, Annamalai nagar, Tamil Nadu, India were selected as subjects at random. The age of the subjects were ranged from 18 to 20 years. The selected subjects were divided into three equal groups of fifteen subjects each, such as high intensity circuit training group (Group I), low intensity circuit training group (Group II) and control group (Group III). The experimental groups (Group I and Group II) underwent their respective training programmes for three days per week for twelve weeks. Group III acted as control in which they did not undergo any special training programme apart from their regular physical education programme. All the subjects of three groups were tested on selected criterion variable at prior to and immediately after the training programme by using leg lift with dyanamometer and bend knee sit up test respectively. The analysis of covariance (ANCOVA) was used to analysis the significant difference, if any in-among the groups. The level of significant to test the 'F' ratio obtained by the analyses of covariance was tested at.05 level of confidence, which was considered as an appropriate. Since, three groups were compared, whenever the obtained 'F' ratio for adjusted post test was found to be significant, the Scheffe's test to find out the paired mean differences, if any among the groups. The results of the study revealed that there was a significant difference among high intensity circuit training group, low intensity circuit training group and control group on selected criterion variables such as leg strength and strength endurance. Significant improvements on selected criterion variables were also noticed due to different intensities of circuit training programmes.

Keywords: purpose, programmes, strength, covariance, purpose

Introduction
Sports training are a basic preparation of the sportsmen for better performance through physical exercise. It is based on scientific principles of aiming at education and performance, enhancement. Sports activities consists of motor movement and action and their success depends to a great extend on how correctly they are performed. Techniques of training and improvement of tactical efficiencies plays a vital role in training process.
Circuit training is a form of body conditioning or endurance training or resistance training using high-intensity aerobics. It targets strength building and muscular endurance. An exercise "circuit" is one completion of all prescribed exercises in the program. When one circuit is complete, one begins the first exercise again for the next circuit. Traditionally, the time between exercises in circuit training is short, often with rapid movement to the next exercise.

Methodology
The purpose of the study was to find out the effects of different intensities of circuit trainings on selected physical fitness parameters such as leg strength and strength endurance. To achieve this purpose of the study, forty-five men students studying bachelor's degree in the Department of Physical Education, Annamalai University, Annamalai nagar, Tamil Nadu, India were selected as subjects at random. The age of the subjects were ranged from 18 to 20 years. The selected subjects were divided into three equal groups of fifteen subjects each, such as high intensity circuit training group (Group I), low intensity circuit training group (Group II) and control group (Group III). The experimental groups (Group I and Group II) underwent their respective training programmes for three days per week for twelve weeks. Group III acted as control in which they did not undergo any special training programme apart from their regular physical education programme. All the subjects of three groups were tested on selected criterion variable at prior to and immediately after the training programme by using leg lift with dyanamometer and bend knee sit up test respectively. The analysis of covariance (ANCOVA) was used to analysis the significant difference, if any in-among the groups. The level of significant to test the 'F' ratio obtained by the analyses of covariance was tested at .05 level of confidence, which was considered as an appropriate. Since, three groups were compared, whenever the obtained 'F' ratio for adjusted post test was found to be significant, the Scheffe's test to find out the paired mean differences, if any among the groups.

Analysis of the data
The influence of different intensities of circuit trainings on each criterion variables were analyzed separately and presented below.

Leg Strength
The analysis of covariance on leg strength of the pre and post test scores of different intensities of circuit training groups and control group have been analysed and presented

in Table I.

Table I: Analysis of covariance of the data on leg strenth of pre and post tests scores of different intensities of circuit training groups and control group

test	High Intensity circuit Training Group	Low intensity circuit Training Group	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	Obtained 'F' Ratio
Pre Test								
Mean	93.067	93.33	93.13	Between	0.578	2	0.289	0.404
S.D.	9.647	9.6609	0.056	Within	30	42	0.714	
Post Test								
Mean	96.27	94.53	93.27	Between	68.04	2	34.02	60.55*
S.D.	9.81	9.72	9.66	Within	23.6	42	0.562	
Adjusted Post Test								
Mean	96.35	94.41	93.30	Between	71.24	2	35.62	218.79*
				Within	6.675	41	0.163	

* Significant at .05 level of confidence.

(The table values required for significance at .05 level of confidence for 2 and 42 and 2 and 41 are 3.225 and 3.226 respectively).

The table I shows that the pre-test mean values on leg strength of high intensity circuit training group, low intensity circuit training group and control group are 93.067, 93.33 and 93.13 respectively. the obtained "F" ratio of 0.404 for pre-test scores is less than the table value of 3.226 for df 1 and 42 required for significance at .05 level of confidence on leg strength. The post-test mean values on leg strength of high intensity circuit training group, low intensity circuit training group and control group are 96.27, 94.53 and 93.27 respectively. the obtained "F" ratio of 60.55 for post test scores is more than the table value of 3.226 for df 2 and 42 required for significance at .05 level of confidence on leg strength.

The adjusted post-test means of high intensity circuit training group, low intensity circuit training group and control group are 96.35, 94.41 and 93.30 respectively. the obtained "F" ratio of 218.79 for adjusted post-test means is more than the table value of 3.35 for df 2 and 41 required for significance at .05 level of confidence on leg strength.

The results of the study indicated that there was a significant difference between the adjusted post-test means of high intensity circuit training group, low intensity circuit training group and control group on leg strength. Since, three groups were compared, whenever the obtained 'F' ratio for adjusted post test was found to be significant, the Scheffe's test to find out the paired mean differences and it was presented in Table II

Table II: The scheffe's test for the differences between paired means on leg strength

High Intensity circuit training Group	Low Intensity circuit Training Group	Control Group	Mean Differences	Confidence Interval Value
96.35	94.41	-	1.94	0.37
96.35	-	93.30	3.05*	0.37
-	94.41	93.30	1.11*	0.37

* Significant at .05 level of confidence.

Table II shows that the mean difference values between high intensity circuit training group and low intensity circuit training group, high intensity circuit training group and control group and low intensity circuit training group and control group 1.94, 3.05 and 1.11 respectively on leg strength which were greater than the required confidence interval value 0.37 for significance.

The results of this study showed that there was a significant difference exists between high intensity circuit training group and low intensity circuit training group, high intensity circuit training group and control group and low intensity circuit training group and control group on leg strength.

Strength endurance

The analysis of covariance on strength endurance of the pre and post test scores of different intensities of circuit training groups and control group have been analysed and presented in Table III.

Table III: Analysis of covariance of the data on strenth endurance of pre and post tests scores of different intensities of circuit training groups and control group

test	High Intensity circuit Training Group	Low intensity circuit Training Group	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	Obtained 'F' Ratio
Pre Test								
Mean	32.87	33.07	32.93	Between	0.31	2	0.156	0.255
S.D.	5.733	5.75	5.739	Within	25.6	42	0.609	
Post Test								
Mean	37.2	35.2	33.07	Between	128.18	2	64.089	136.41*
S.D.	6.099	5.933	5.750	Within	19.73	42	0.4698	
Adjusted Post Test								
Mean	37.27	35.11	33.084	Between	130.9	2	65.47	400.69*
				Within	6.699	41	0.163	

(The table values required for significance at .05 level of confidence for 2 and 42 and 2 and 41 are 3.225 and 3.226 respectively).

The table III shows that the pre-test mean values on strength endurance of high intensity circuit training group, low intensity circuit training group and control group are 32.87, 33.07 and 32.93 respectively. The obtained "F" ratio of 0.255 for pre-test scores is less than the table value of 3.226 for df 1 and 42 required for significance at .05 level of confidence on strength endurance. The post-test mean values on strength endurance of high intensity circuit training group, low intensity circuit training group and control group are 37.2, 35.11 and 33.07 respectively. the obtained "F" ratio of 136.41 for post test scores is more than the table value of 3.226 for df 2 and 42 required for significance at .05 level of confidence on strength endurance.

The adjusted post-test means of high intensity circuit training group, low intensity circuit training group and control group are 37.27, 35.11 and 33.084 respectively. the obtained "F" ratio of 400.69 for adjusted post-test means is more than the table value of 3.35 for df 2 and 41 required for significance at .05 level of confidence on strength endurance.

The results of the study indicated that there was a significant difference between the adjusted post-test means of high intensity circuit training group, low intensity circuit training group and control group on strength endurance. Since, three groups were compared, whenever the obtained 'F' ratio for adjusted post test was found to be significant, the Scheffe's test to find out the paired mean differences and it was presented in Table IV.

Table IV: The scheffe's test for the differences between paired means on strength endurance

High Intensity circuit training Group	Low Intensity circuit Training Group	Control Group	Mean Differences	Confidence Interval Value
37.27	35.11	-	2.16	0.37
37.27	-	33.084	4.19*	0.37
-	35.11	33.084	2.03*	0.37

* Significant at.05 level of confidence.

Table IV shows that the mean difference values between high intensity circuit training group and low intensity circuit training group, high intensity circuit training group and control group and low intensity circuit training group and control group 2.16, 4.19 and 2.03 respectively on strength endurance which were greater than the required confidence interval value 0.13 for significance.

The results of this study showed that there was a significant difference exists between high intensity circuit training group and low intensity circuit training group, high intensity circuit training group and control group and low intensity circuit training group and control group on strength endurance.

Conclusions

Based on the results of the study, the following conclusions were drawn.

1. There was a significant difference among high intensity circuit training group, low intensity circuit training group and control group on leg strength.
2. There was a significant difference among high intensity circuit training group, low intensity circuit training group and control group on strength endurance.
3. And also it was found that there was a significant improvement on selected criterion variables such as leg strength and strength endurance due to high and low intensity circuit trainings.

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