Effect of Stationary Circuit and Moving Circuit Trainings on Selected Physical Fitness Components among University Men Students

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Abstract
The purpose of the study was to find out the effects of stationary circuit training [SCT] and Moving circuit training [MCT] on selected physical fitness components namely muscular endurance [ME] and cardio respiratory endurance [CRE] among university men students. To achieve this purpose of the study, forty-five men students studying men students studying Department of Physical Education, Annamalai University, Chidambaram, Tamil Nadu, India were selected as subjects at random. Their age ranged between 18 to 24 years. The selected subjects were divided into three equal groups of fifteen each namely stationary circuit training group [SCTG], Moving circuit training group [MCTG] and control group [CG]. The experimental group I underwent stationary circuit training [SCT] and group II underwent Moving circuit training [MCT] for three days per week for twelve weeks whereas the control group maintained their daily routine activities and no special training was given to them. The following physical fitness components, namely muscular endurance [ME] and cardio respiratory endurance [CRE] were selected as criterion variables. The subjects of the three groups were tested on selected physical fitness components namely muscular endurance and cardio respiratory endurance using standardized tests namely bend knee sit-ups and Cooper's 12 min Run / Walk test at prior and immediately after the training period. The collected data were analyzed statistically through analysis of covariance (ANCOVA) to find out the significant difference, if any among the groups. Whenever the obtained "F" ratio was found to be significant, the Scheffe's test was applied as post hoc test to find out the paired mean difference, if any. The .05 level of confidence was fixed to test the level of significance which was considered appropriate. The results of the study showed that there was a significant difference exist among SCTG, MCTG and CG on selected physical fitness components namely ME and CRE. And also, SCTG and MCTG showed significant improvement on ME and CRE when compared to control group.

Keywords: Stationary Circuit Training [SCT], Moving Circuit Training [MCT], Muscular Endurance [ME], Cardiorespiratory Endurance [CRE], Analysis of Covariance (ANCOVA)

Introduction

Stationary circuit training is a highly effective form of exercise that involves performing a series of strength, endurance, and cardiovascular exercises in a continuous loop, with minimal rest in between. Unlike traditional circuit training, where participants move from one station to another, stationary circuit training involves performing all exercises in one spot. The concept of stationary circuit training revolves around the idea of maximizing efficiency and convenience while targeting multiple muscle groups and aspects of physical fitness simultaneously. It is often favored by individuals who have limited space, equipment, or time constraints, as it can be done virtually anywhere with minimal equipment. Stationary circuit training typically consists of a series of exercises arranged in a specific sequence, with each exercise targeting different muscle groups or fitness components such as strength, endurance, flexibility, or balance. Common exercises include bodyweight squats, push-ups, lunges, planks, jumping jacks, burpees, and high knees, among others.

The key principle of stationary circuit training is to keep the body moving throughout the workout, maintaining an elevated heart rate, and engaging multiple muscle groups to maximize calorie burn and improve overall fitness levels. By performing a variety of exercises back-to-back with minimal rest, participants can effectively challenge their cardiovascular system, build strength and endurance, and enhance muscular tone and definition.

Moving circuit training is a dynamic and versatile form of exercise that combines cardiovascular conditioning, strength training, and endurance building in a fast-paced circuit format. Unlike traditional circuit training where participants move from one exercise station to another, moving circuit training involves continuous movement throughout the circuit, incorporating exercises that engage multiple muscle groups and elevate the heart rate. The concept behind moving circuit training is to keep the body in constant motion, maximizing calorie burn and promoting overall fitness in a time-efficient manner. This form of training can be adapted to various fitness levels and preferences, allowing individuals to customize their workouts based on their goals and capabilities.

Moving circuit training often incorporates body weight exercises, resistance bands, free weights, and functional movements such as lunges, squats, push-ups, and burpees. It can be performed in various settings, including gyms, outdoor spaces, and even at home with minimal equipment. One of the key benefits of moving circuit training is its ability to improve both cardiovascular health and muscular strength simultaneously. By challenging the body with a variety of exercises performed in quick succession, participants can enhance their endurance, agility, balance, and coordination while building lean muscle mass and burning calories.

Methodology

The purpose of the study was to find out the effects of stationary circuit training [SCT] and Moving circuit training [MCT] on selected physical fitness components namely muscular endurance [ME] and cardiorespiratory endurance [CRE] among university men students. To achieve this purpose of the study, forty-five men students studying men students studying Department of Physical Education, Annamalai University, Chidambaram, Tamil Nadu, India were selected as subjects at random. Their age ranged between 18 to 24 years. The selected subjects were divided into three equal groups of fifteen each namely stationary circuit training group [SCTG], Moving circuit training group [MCTG] and control group [CG]. The experimental group I underwent stationary circuit training [SCT] and group II underwent Moving circuit training [MCT] for three days per week for twelve weeks whereas the control group maintained their daily routine activities and no special training was given to them. The following physical fitness components, namely muscular endurance [ME] and cardio-respiratory endurance [CRE] were selected as criterion variables. The subjects of the three groups were tested on selected physical fitness components namely muscular endurance and cardiorespiratory endurance using standardized tests namely bend knee sit-ups and Cooper's 12 min Run / Walk test at prior and immediately after the training period. The collected data were analyzed statistically through analysis of covariance (ANCOVA) to find out the significant difference, if any among the groups. Whenever the obtained "F" ratio was found to be significant, the Scheffe's test was applied as post hoc test to find out the paired mean difference, if any. The .05 level of confidence was fixed to test the level of significance which was considered appropriate.

Training Programme

During the training period, Group I underwent [SCT] and Group II underwent [MCT] for three days per week (alternative days) for twelve weeks. Every day the workout lasted for 45 to 60 minutes approximately including warming up and warming down periods. Group III acted as control who did not participate in any strenuous physical exercises and specific training throughout the training period. However, they performed activities as per their curriculum.

Analysis of the Data

The analysis of covariance on selected physical fitness components of SCTG, MCTG and CG have been analyzed and presented below.

Muscular Endurance

The analysis of covariance on muscular endurance of the pre and post test scores of SCTG, MCTG and CG have been analyzed and presented in Table 1.

Table 1 Analysis of Covariance of The Data on Muscular Endurance of Pre and Post Tests Scores of SCTG, MCTG and CG

Test	SCTG	MCTG	CG	SOV	SS	df	MS	OF
Pre Test								
Mean	34.27	33.53	33.87	Between	4.04	2	2.02	0.114
SD	3.80	4.39	3.96	Within	742.40	42	17.68	
Post Test								
Mean	36.33	38.73	34.13	Between	158.80	2	79.40	4.93*
SD	3.88	3.77	3.98	Within	676.00	42	16.10	
Adjusted Post Test								
Mean	35.98	39.07	34.15	Between	184.60	2	92.30	149.88*
				Within	25.25	41	0.62	

*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 3.222 and 3.226 respectively

The adjusted post-test means of SCTG, MCTG and CG are 35.98, 39.07 and 34.15 respectively. The obtained "F" ratio of 149.88 for adjusted post-test means is greater than the table value of 3.226 for df 1 and 42 required for significance at .05 level of confidence on muscular endurance.

Since, three groups were compared whenever the obtained "F" ratio for the adjusted post test was found to be significant, the Scheffe's test was applied as post hoc test to find out the paired mean differences, if any and it was presented in table 1A.

Table 1A showed that the mean difference values between SCTG and MCTG, SCTG and CG, MCTG and CG on muscular endurance were 3.09, 1.83 and 4.91 respectively which were greater than the required confidence interval value 0.73. The results of the study showed that there was a significant difference between SCTG and MCTG, SCTG and CG, MCTG and CG on muscular endurance.

Table 1A The Scheffe's Test for The Differences between Paired Means on Muscular Endurance

SCTG	MCTG	CG	MD	CI
35.98	39.07		3.09*	0.73
35.98		34.15	1.83*	0.73
	39.07	34.15	4.91*	0.73

*Significant at .05 level of confidence.

Table 2 Analysis of Covariance of the Data on Cardiorespiratory Endurance of Pre and Post Tests Scores of SCTG, MCTG and CG

Test	SCTG	MCTG	CG	SOV	SS	df	MS	OF
Pre Test								
Mean	1423.67	1418.00	1426.00	Between	507.78	2	253.89	0.54
S.D.	21.94	20.31	20.59	Within	19773.33	42	470.79	
Post Test								
Mean	1466.00	1586.00	1427.47	Between	205088.18	2	102544.09	238.90*
S.D.	27.28	6.11	20.51	Within	18027.73	42	429.23	
Adjusted Post Test								
Mean	1465.51	1588.03	1425.93	Between	208907.12	2	104453.56	303.45*
				Within	14113.13	41	344.22	

*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 3.222 and 3.226 respectively)

Cardiorespiratory Endurance

The analysis of covariance on cardio-respiratory endurance of the pre and post test scores of SCTG, MCTG and CG have been analyzed and presented in Table 2.

The adjusted post-test means of SCTG, MCTG and CG are 1465.51, 1588.03 and 1425.93 respectively. The obtained "F" ratio of 303.45 for adjusted post-test means is greater than the table value of 3.226 for df 2 and 41 required for significance at .05 level of confidence on cardiorespiratory endurance.

Since, three groups were compared whenever the obtained "F" ratio for the adjusted post test was found to be significant, the Scheffe's test was applied as post hoc test to find out the paired mean differences, if any and it was presented in table 2A.

Table 2A The Scheffe's Test for The Differences between Paired Means on Cardiorespiratory Endurance

SCTG	MCTG	CG	MD	CI
1465.51	1588.03		122.52*	17.19
1465.51		1425.93	39.57*	17.19
	1588.03	1425.93	162.09*	17.19

* Significant at .05 level of confidence.

The table 2A showed that the mean difference values between SCTG and MCTG, SCTG and CG and MCTG and CG on cardiorespiratory endurance were 122.52, 39.57and 162.09 respectively which were greater than the required confidence interval value 17.19. The results of the study showed that there was a significant difference between SCTG and MCTG, SCTG and CG and MCTG and CG on cardiorespiratory endurance.

Conclusion

The results of the study showed that there was a significant difference among stationary circuit training group, Moving circuit training group and control group on muscular endurance and cardiorespiratory endurance and also, it was showed that there was a significant change in muscular endurance and cardiorespiratory endurance due to Stationary circuit training and Moving circuit training.

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