EFFECT OF AEROBIC CROSS TRAINING AND AEROBIC TRAINING ON PERCENT BODY FAT ON COLLEGE MALE STUDENTS

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ABSTRACT

The purpose of the present study was to find the effect of aerobic cross training and aerobic training on percent body fat on college male students. For this purpose of the study forty five subjects studying various courses of bachelor degree at Vivekananda Arts and Science College, Villupuram, Tamil Nadu, India were selected at random as subjects in the age group of 19 – 24 years. They were divided into three equal groups, each group consisted of fifteen subjects, in which group – I underwent aerobic cross training, group – II underwent aerobic training and group – III acted as control group who did not participate in any special training. The training period for this study was three days in a week for twelve weeks. Prior to and after the training period the subjects were tested for percent body fat. The analysis of covariance (ANCOVA) was used to find out the significant difference if any, among the experimental groups and control group on selected criterion variable. In all the cases, .05 level of confidence was fixed to test the significance, which was considered as appropriate. Since there were three groups involved in this study, the Scheffe'S test was used as post-hoc test to determine the paired mean differences. As a result of aerobic cross training and aerobic training the percent body fat of the subject is significantly decreased. It is also concluded that aerobic training is better than aerobic cross training in altering percent body fat.

Key words: Aerobic cross training, Aerobic training, Percent body fat

INTRODUTION

Sports training is a major part of the sports preparation process as it is a physical and educational process based on exercises to improve the physical preparation components necessary for achieving the highest possible level in sports through various methods of training and various means of load formation and rest intervals. It concentrates on specific physical and psychological aspects in each sport.

One of the most important aspects of health-related fitness is the cardiovascular endurance or the aerobic capacity of an individual. Aerobic fitness can be defined as the ability to take in, transport, and utilize oxygen. Since aerobic fitness involves many important organs and systems, it tells much about the health of these components and about the health in general. Aerobic fitness is high physical health and mental health also is enhanced (Farahani et al., 2010). The benefits of aerobic exercise and fitness include improved circulation and respiration; reduced risk of heart diseases; improved fat metabolism and reduced body weight (fat free body mass); strengthened bones, ligaments and tendons; personality changes like enhanced self-concept and body image and emotional stability. The increased capacity and adaptability associated with aerobic fitness can add life to your years, not just years to your life.

Cross-training means engaging in two or more sports activities which provides variety, fitness and injury prevention. Running and resistance works (*such as weight training*) are examples. Dance and gymnastics provide muscular strength and develop better balance, flexibility and agility. The concept of cross training is a relatively recent athletic application, in which a training regime includes the use of one distinct athletic discipline to build skills or fitness in another. Cross-training is when an athlete undertakes training in a discipline other than their main sport for the sole purpose of enhancing performance in their main sport. One gets off easy by doing two different exercises with moderate exertion instead of doing one exercise with increased exertion. For a distance runner any non running activity qualifies as cross training. To get the best results from cross training, one should do only two or three different activities.

While some studies have demonstrated that respiratory muscle endurance training (RMET) improves performances during various exercise modalities, e.g., cycling, rowing, or running (McConnell, 2009) and brings about changes in pulmonary function, increased vital capacity and decreased residual volume. Esposito et al., (2010), controversy continues about the transfer of RMET effects to swimming performance. Harms et al., (1997) have found a reciprocal relationship between the work of breathing and legs blood flow during maximal exercise on cycle ergo-meter. Thereafter, several authors (Sheel et al., 2002) have concluded that the stimulus for limb vasoconstriction was a cardiovascular reflex originating within the inspiratory muscles.

Body fat percentage is the percentage of total body weight that is comprised of fat. Decreasing body fat percentage, if it is too high, isn't just about improving appearance. A high percentage of body fat can have a negative effect on overall well being. Excess fat has been linked to numerous health problems such as increased risk for diseases such as cancer, diabetes and heart disease. Having excess fat, specifically surrounding the internal organs, can damage health and contribute to serious medical conditions such as liver disease. The present study was to find out the effects of aerobic cross training and aerobic training on percent body fat of college male students.

METHODOLOGY

The purpose of the study was to analyze the effects of aerobic cross training and aerobic training on percent body fat. To achieve the purpose of the study, forty five (N=45) male students studying various course of bachelor degree at Vivekananda Arts and Science College, Villupuram, Tamil Nadu, India were selected at random as subjects from a population of 200. The age of the subjects, ranged from 18 to 24 years. The selected subjects were medically and physically fit enough to under go the aerobic cross training and aerobic training program. The subjects were randomly divided into three groups and each group comprised of fifteen (n=15) subjects. Group-I underwent aerobic cross training (swimming and cycling), group-II underwent aerobic training (running) and group–III acted as control. The group I underwent aerobic training program and group II underwent aerobic cross training program (swimming & cycling), for three days per week for twelve weeks, and Group III acted as control who did not participate any special training programs. Percent body fat was selected as criterion variable and was assessed by using Skin Fold Caliper

Training Programme

The prescribed exercise program focused on one or more cardiovascular endurance activities. Traditionally, the activities prescribed most frequently for cross training have been walking, jogging, running, hiking, cycling and swimming. However in the present study only cycling and swimming were selected for cross training and aerobic training includes only running. The intensity of the exercise is the most important factor. Evidence now suggests that a substantial training effect can be accomplished in by training at intensities of 45% or less of their aerobic capacities. For most, however, the appropriate intensity appears to be at a level of at least 60% of Vo_2max.

Exercise intensity can be quantified on the basis of the training heart rate (THR), the metabolic equivalent (MET), or the rating of perceived exertion (RPE). In the present investigation the training intensity has been prescribed on the basis of metabolic equivalent (MET) system. The amount of oxygen his body consumes is directly proportional to the energy athlete expend during physical activity. At rest, the body uses approximately 3.5 ml of oxygen per kilogram of body weight per minute ($ml.kg^{-1}. min^{-}$). This resting metabolic rate is referred to as 1.0 MET. All activities can be classified by intensity according to their oxygen requirements. An activity that is rated as a 2.0 MET activity would require two times the resting metabolic rate, as 7 $ml.kg^{-1}. min^{-1}$. Some activities and their MET value are presented in Table I. These values are only approximations, because metabolic efficiency varies considerably from one person to the next, and even in the same individual, even though the MET system in useful as a guideline for training (Jack & David, 1994).

Table-I: Training Schedule

Weeks	Aerobic Cross Training						Aerobic Training	
	Cycling		Swimming				Running	
	Duration (minutes)	Distance (mile)	Set	Rep	Distance (mts)	Recovery (sec)	Duration (minutes)	Distance (mts)
1-2	18.46	4	2	4	50	90	16	3200
3-4	19.66	4.5	2	5	50	90	20	4000
5-6	21.85	5	2	6	50	90	24	4800
7-8	24.03	5.5	2	7	50	90	28	5600
9-10	26.23	6	2	8	50	90	32	6400
11-12	28.40	6.5	2	9	50	90	36	7200

** Swimming set Recovery 5 min*

*** Work and recovery ratio was followed repetition*

METS

Cycling 4 mints 37 sec - 1 mile (1600 mts)

Swimming 16.6 sec - 10 mts

Running 8 mts - 1 mile (1600 mts)

Statistic Technique

All the subjects of three groups were tested on dependent variables at prior to and immediately after the training program. The analysis of covariance (ANCOVA) was used to analyze the significant difference, if any among the groups. 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. The .05 level of confidence was fixed as the level of significance to test the 'F' ratio obtained by the analysis of covariance, which was considered as an appropriate and the results are presented below.

RESULT OF THE STUDY

Table-11: Analysis of Covariance for Pre and Post Test Data on Percent Body Fat of Aerobic Cross Training and Aerobic Training Groups and Control Group

	Group I	Group II	Group III	Source of variance	Sum of Squares	df	Mean squares	'F' ratio
Pretest Mean SD	15.40	15.93	15.83	B	2.84	2	1.42	0.37
	2.09	1.66	2.01	W	157.46	42	3.74	
Posttest Mean SD	14.06	13.40	16.00	B	54.71	2	27.35	9.08*
	1.90	1.45	1.81	W	126.53	42	3.01	
Adjusted Posttest Mean	14.36	13.25	15.85	B	51.04	2	25.52	65.88*
				W	15.88	41	0.38	

** Significant at 0.05 level of confidence. The table value required for significance at 3.22*

The adjusted post-test mean on percent body fat for aerobic cross training group is 14.36, aerobic training group is 13.25 and control group is 15.85. The obtained 'F' ratio of 65.88 for adjusted post-test mean is more than the table value of 3.22 required for significance at 0.05 levels for df 2 and 41. The results of the study showed that there was a significant difference among three groups on percent body fat.

Table – II1: Scheffe's Post Hoc Test for the Adjusted Post-Test Paired Mean Differences on Percent Body Fat

Adjusted Post Test Means				Confidence Interval
Aerobic Cross Training Group	Aerobic Training Group	Control Group	Mean Difference	
14.36	13.25		1.11*	0.56
14.36		15.85	1.49*	0.56
	13.25	15.85	2.6*	0.56

**Significant at 0.05 level of Confidence.*

Table III shows that the adjusted post test paired mean difference between aerobic cross training and aerobic training, aerobic cross training and control group and aerobic training and control group are 1.11, 1.49 and 2.6 for percent body fat respectively. All the three are higher than the confidence interval of 0.56 required for significance at 0.05 level of confidence. It is inferred that the twelve weeks of aerobic cross training and aerobic training groups have significantly decreased the percent body fat as compared to the control group. The result also reveals that the decrease in percent body fat is significantly more for aerobic training group as compared to aerobic cross training group.

DISCUSSION

The result of the study showed significant decrease on percent body fat for both the experimental groups as compared to control group. The decrease in percent body fat was significantly greater for aerobic training group than aerobic cross training group. The main reason is that in aerobic training the volume of load is greater with more stress on lungs and heart which results in fat oxidation. More fat are burnt in aerobic training than aerobic cross training. Capostagno and Bosch, (2010) examined the differences in fat and carbohydrate oxidation during running and cycling at the same relative exercise intensities and load. It was found that fat oxidation was shown to be significantly higher in running than in cycling at the same relative intensities. Shang and Hasenberg (2010) conducted a study to determine the effect of aerobic endurance training on weight loss and body composition in patients and noticed rapid reduction of body mass index, excess weight loss and fat mass. Narayani and Sudhan Paul Raj (2010) conducted a study on effect of aerobic training among obese women and concluded that there were significant decreases in percent body fat compared to the control group. The decrease in body fat percentage after the effects the aerobic training is in conformity with the studies of Faith et al., (2009) concluded that the physical activity can influence body composition. The possible reason of reduction of body fat was endurance training which increased greater utilization of fat for energetic (Carbuhn et al., 2010; Malousaris et al., 2008). Therefore, it can be stated that Handball players can lose body fat more during pre training and after training program of training. This might be due to intensive training and competition schedule. Before and after the season, during the interval most players have their fat content increased, presumably owing to reduced aerobic activity along with nutritional and behavioral changes.

CONCULSION

There was a significant decrease in percent body fat for both aerobic cross training and aerobic training groups as compared to control group. There was a significant decrease in percent body fat for aerobic training group as compared to aerobic cross training group.

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