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Effect of different intensities of aerobic training on vital capacity of middle aged obese men

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KEYWORDS

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A B S T R A C T

To achieve this purpose forty five (N = 45) obese men (BMI 30 ± 1 kg/m²) from Annamalainagar , Chidambaram, Tamil Nadu, India) from the total population of (obese volunteers) 173 were selected at random subjects for this study. Their age mean height and weight were 43 ± 2.7 years, 168 ± 6 cm and 81 ± 3.7 kg respectively. They were randomly divided into three equal groups, and each group consisted of fifteen (n = 15) subjects, in which, Group I underwent low intensity aerobic training, Group II underwent high intensity aerobic training and Group III acted as control. Low Intensity was Pedal at cadence of 40 revolutions per minute of bicycle ergo meter training for 5 days per week for sixteen weeks. High intensity Pedal at cadence of 60 revolutions per Minute of bicycle ergo meter training for 5 days per week for sixteen weeks. The selected criterion variable vital capacity(vc), Computerized spirometry was used to assess VC. Pre-test data were collected two days before the training program and post-test data were collected two days after the training program. The collected data treated with ANCOVA. Level of confidence was fixed at 0.05. If obtained 'F' ratio significant scheffe's post hoc test were used. The results showed that High intensity aerobic training positively influences the cardiopulmonary (vital capacity, variable of middle-aged obese men. Low intensity aerobic training also positively influences the cardiopulmonary (vital capacity,) variable of middle-aged obese men.

Introduction

Health, which is considered as the most precious asset of human being, is highly determined by the physical fitness status of the individual. For leading happy and prosperous life, being healthful is highly essential. An individual needs to be

sufficiently physically fit to lead the normal life in comfortable manner, free from different ailments and can enjoy the life to the fullest. Physical exercises are essential to improve and to maintain the physical fitness of individual. Since, different

physical exercise target different organs of the body, the selection of exercise should be selectively objective. Fitness can be conceived as the matching of the individual to his or her physical and social environment. The WHO defined fitness as “the ability to perform muscular work satisfactorily”. In keeping with this definition, fitness implies that the individual has attained those characteristics that permit a good performance of a given physical task in a specified physical, social and psychological environment. The components of fitness are numerous and are determined by several variables including the individual’s pattern of living habits, diet and heredity.

Fitness is operationalized in the present day western societies with a focus on two goals: performance and health. Fitness for performance is necessary for optimal work or sports performance. Health related fitness refers to those components of fitness that are affected favourably or unfavourably by habitual physical activity and related to health status (David Miller, 1994).

Although regular physical exercise has a positive influence on health, a high level of fitness-related health has a greater influence (Eriksson, 2001). The terms overweight and obesity is often used interchangeably, but technically they have different meaning. Overweight is defined as body weight that exceeds the normal or standard weight for a particular person based on height and frame size. Obesity refers to the condition in which a person has an excessive amount of body fat. This implies that the actual amount of body fat or its percent of the total weight must be associated or estimated. Exact standards for allowable fat percentages have not been established. However, men with more than 25% body fat and women with more than 35% should be considered obese.

Any physical training (activity) leads to anatomical, physical, physiological, biochemical and psychological changes. The efficiency of a physical activity results from its duration, and repetitions (volume), load and velocity (intensity), and the frequency of performance (density). When planning the dynamics of training, consider these aspects, referred to as the variables of training.

All training responses result in stress and adaptation. A stress is placed on the system and the body adapts to it. If the stress is not too intense, the adaptation will result in the body being stronger than before Veadmir (1995), the major objective in training is to cause biological adaptation in order to improve performance in a specific task. In biology, adaptation is considered as one of the main feature of living species. In physical education, exercise or regular physical work is a very powerful stimulus for adaptation. The purpose of the study was find out effect of different intensities of aerobic training on vital capacity of middle aged obese men.

Methodology

To achieve this purpose forty five (N = 45) obese men (BMI 30 ± 1 kg/m²) from Annamalainagar, Chidambaram, Tamil Nadu, India) from the total population of (obese volunteers) 173 were selected at random subjects for this study. Their age mean height and weight were 43 ± 2.7 years, 168 ± 6 cm and 81 ± 3.7 kg respectively. They were randomly divided into three equal groups, and each group consisted of fifteen (n = 15) subjects, in which, Group I underwent low intensity aerobic training, Group II underwent high intensity aerobic training and Group III acted as control. Low Intensity was Pedal at cadence of 40 revolutions per minute of bicycle ergo

meter training for 5 days per week for sixteen weeks. High intensity Pedal at cadence of 60 revolutions per Minute of bicycle ergo meter training for 5 days per week for sixteen weeks. The selected criterion variable were cardio-pulmonary variable VC (vital capacity), computerized spirometry was used to assess VC. Pre-test data were collected two days before the training program and post-test data were collected two days after the training program. The collected data treated with ANCOVA. Level of confidence was fixed at 0.05. If obtained 'F' ratio significant scheffe's post hoc test were used.

Training Program

The percentage of intensity (Watts) variations in sixteen weeks training for 40 revolutions and 60 revolutions groups are given below:

Table-I

Week	1	3	5	7	9	11	13	15
	&	&	&	&	&	&	&	&
	2	4	6	8	10	12	14	16
% of Intensity (Watts)	60	65	70	75	80	85	90	95

Result and Discussion

The table II shows that the pre-test means of low and high intensity groups and control group are 2.72, 2.73 and 2.71 respectively. The obtained 'F' ratio of 0.104 for pre-test means of vital capacity is lesser than the table value 3.22 for df 2 and 42 required for significance at 0.05 level. The post-test means of low and high intensity groups and control group are 3.29, 3.19 and 2.77 respectively. The obtained 'F' ratio of 24.65 for post-test means of vital capacity is higher than the table value 3.22 for df 2 and 42 required for significance at 0.05 level. The adjusted post-test means of low and high intensity groups and control group are

3.30, 3.18 and 2.78 respectively. The obtained 'F' ratio of 33.39 for adjusted post-test means of vital capacity is higher than the table value of 3.21 for df 2 and 41 required for significance at 0.05 level.

The results of the study indicate that there is a significant difference among low intensity, high intensity and control groups on vital capacity. To determine which of the paired means had a significant difference, Scheffe's post-hoc test was applied and the results are presented in Table III.

The table III shows the adjusted post-test mean difference of vital capacity between low intensity and high intensity groups, low intensity and control groups and high intensity and control groups are 0.12, 0.52 and 0.40 respectively, which were greater than 0.16 at 0.05 level of confidence. The results of the study showed that, high intensity aerobic and low intensity aerobic training groups has significantly differed on vital capacity level when compared to control group, but between the training significant differences was not found. Hence it was concluded that both high and low intensity aerobic training was equally better method to increase the vital capacity level. The adjusted post-test mean values of low intensity, high intensity and control groups on vital capacity level were graphically represented to Figure I.

The results shows that High intensity, Low intensity aerobic training positively influences the cardiopulmonary (vital capacity,) variable of middle-aged obese men. Same results agreement with the consequence of these pulmonary effects has the potential to adversely affect aerobic capacity and exercise tolerance (Harms, 2006). High intensity aerobic exercise showed positive change in both forced vital capacity and FEV₁ (Huang and Osness, 2005).

Table.II Analysis of covariance on vital capacity of low and high intensity aerobic training groups and control group

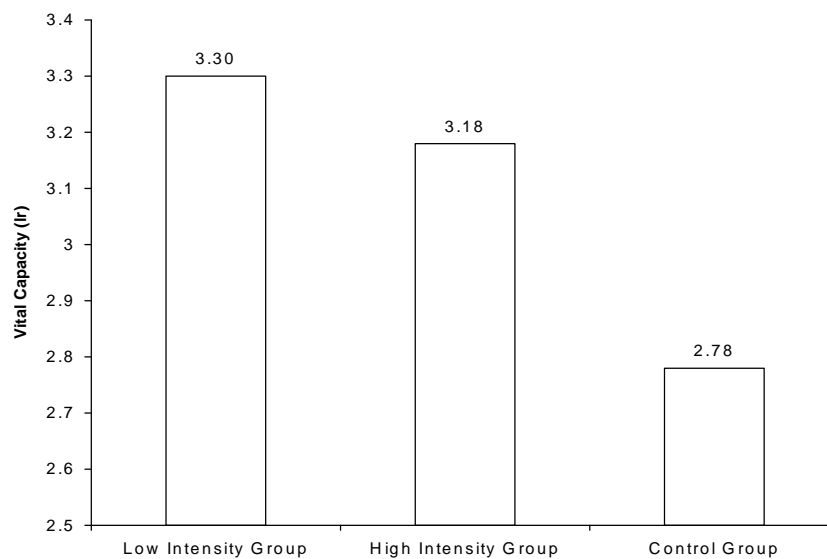
		Low Intensity Group	High Intensity Group	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	'F' Ratio
Pre-test	\bar{X}	2.72	2.73	2.71	B	0.006	2	0.003	0.104
	σ^2	0.160	0.134	0.211	W	1.237	42	0.029	
Post-test	\bar{X}	3.29	3.19	2.77	B	2.286	2	1.143	24.65*
	σ^2	0.26	0.18	0.19	W	1.948	42	0.046	
Adjusted Post-test	\bar{X}	3.30	3.18	2.78	B	2.18	2	1.092	33.39*
					W	1.34	41	0.033	

* The table value for significance at 0.05 level of confidence with df 2 and 42 and 2 and 41 are 3.22 and 3.21, respectively.

Table.III Scheffe's test for the difference between the adjusted post-test paired means of vital capacity

Adjusted Post-test Means			Mean Differences	Confidence Interval
Low Intensity Group	High Intensity Group	Control Group		
3.30	3.18	-	0.12	0.16
3.30	-	2.78	0.52*	0.16
-	3.18	2.78	0.40*	0.16

* Significant at 0.05 level of confidence.



The present study also shows the same (high intensity aerobic training improves better FEV₁ than low intensity aerobic training). Regular physical activity has a strong positive impact on physical fitness, particularly on aerobic capacity (Maaroos and Landor, 2001). Aerobic exercise may be recommended to improve respiratory muscle strength and endurance as well as the aerobic capacity and maximal ventilator capacity. Intensity swimming training, increases vital capacity, total lung capacity and functional residual capacity. It also promotes isotropic lung growth by harmonizing the development of the airway and of alveolar lung spaces (Courteix *et al.*, 1997). During maximal exercise, the demand for airflow is extremely high and can best be met through an increase in both respiratory rate and tidal volume yielding the tremendously large airflow rates observed in highly trained (Whyte, G.P. *et al.* 2004). The findings of Sezer (2004) shows, maximal exercise improves vital capacity, , speak flow rate, FVC, respiratory exchange ratio. Significant difference was registered in vital capacity between pre and post-tests results in the group that performed the aerobic test protocol (Rouholah and Mohsen, 2010).

The high intensity physical training was more effective than the moderate intensity physical training in enhancing body composition. The cardiovascular fitness of obese adolescents was significantly improved by physical training, especially high intensity physical training (Bernard Gutin *et al.*, 2002). William and Terry (2002), revealed that, training using the pulmonary resistance device produced significant increases in maximal VE and maximal VT while decreasing RR at maximum exercise. Weight loss or aerobic exercise changes static lung volumes in middle-age and older, moderately obese,

sedentary men (Christopher *et al.*, 1999). The results of the study may in conformity with the above findings.

Conclusions

1. High intensity aerobic training positively influences the cardiopulmonary (vital capacity) variable of middle-aged obese men.
2. Low intensity aerobic training also positively influences the cardiopulmonary (vital capacity) variable of middle-aged obese men.

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