STAR
Research Journal

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PHYSICAL EDUCATION

EFFECT OF VARIED INTENSITIES OF AEROBIC TRAINING ON FORCED EXPIRATORY VOLUME (FEV_1) OF MIDDLE AGED OBESE MEN

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Abstract

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 Forced Expiratory Volume in One Second (FEV_1) to assess computerized spirometer was used. 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 result shows that High intensity aerobic training positively increases the cardiopulmonary (Forced Expiratory Volume in One Second (FEV_1), variable of middle-aged obese men.

KEYWORDS: Low Intensity Aerobic Training, High Intensity Aerobic Training, Forced Expiratory Volume in One Second (FEV_1), Bicycle Ergo Meter. ANCOVA.

INTRODUCTION

Everybody desires a long and healthy life and exercise has a great part to play in this. In one aspect the body can be said to commence ageing from the moment it is born, although it is usual to say it really begins in about the mid-thirties. However, different system of the body age at different rates, no doubt depending upon how they are used or not used. Many people continue a very active life, both physically and mentally, well in to their old age. The barrier of these activities often seems to be physiological, well in to their old age. The barrier of these activities often seems to be physiological rather than physical, and when a person thinks he is too old to do something physically he may well be completely wrong, although too much of exercise could do harm. The only way to find out is one can do something to try.

Regular physical exercise is an important component in the prevention of some of the diseases of affluence such as heart disease, cardiovascular disease, Type 2 diabetes, obesity and hypercholesteremia (Swain *et al.*, 2006). Obesity and overweight seems to be caused by complex interchange of factors, including lifestyle, quality (i.e. nutrition content) and spacing (length of time between) of meals, exercise, genetics hormones, metabolism, dieting, history and perhaps even chemical pollutants. Which (if any) of those factors is most important and how they vary between individuals, is still under considerable debate.

A sedentary lifestyle has been associated with an increased risk for two major metabolic and endocrine disorders: obesity and diabetes. Although neither disease by itself represents a major cause of death, both are strongly associated with other disease that have high mortality rates, such as hypertension, coronary artery disease, and cancer. Furthermore millions of people have obesity, diabetes, or both. The consequences of these diseases are debilitating, and costs associated with their treatment are high. At various times throughout human history, obesity has been thought to be caused by basic hormonal imbalances resulting from failure of one or more of the endocrine glands to properly regulate body weight. At other time, it has been believed that gluttony, rather than glandular malfunction, was the primary cause of obesity. In the first case, a person is perceived as having no control over the situation, yet in the second, he or she is held directly responsible! Results of recent medical and physiological research show that obesity can be the result of any one or combination of many factors. Its etiology is not as simple as was once believed.

Obesity is classified into symptomatic obesity, which is caused by different diseases and simple obesity that is caused by the surplus accumulation of fat inside the body. Although there is various cause of simple obesity, genetic and physical constitutional factors, the dietetic factor of excessive calories and the decrease of activity or lack of exercise, become the major factors in the cause of obesity. Therefore, except for the genetic factor, the imbalance between intake calories and consumption calories can be thought of as the major cause of obesity. In balancing energy, the lack of physical activity contributes to the major factor of obesity. Moreover, treating obesity is extremely important because if not addressed the risk of cardiovascular diseases and the loss of self-confidence increases. It also degrades the ability of exercise performances as well as mental, emotional and social interaction. As a rule, obesity is a main risk factor for number of diseases. The etiology of obesity is unclear, although it appears that both genetic and environmental factors contribute to its development (Hanley *et al.*, 1997).

Aerobic exercise strengthens the muscles that are involved in respiration-exercise that facilitate the flow of air in and out of the lungs. Strengthens and enlarges the heart muscle. This improves aerobic conditioning pumping of blood and the heart rate (lowers the pulse of a person when he/she is resting). Tones muscles throughout most of the body. Reduces blood pressure. Improves circulation. Raises the number of red blood cells, which in turn facilitates transportation of oxygen. The sleep quality of insomnia patients can improve with moderate exercise. Improves mental health. Exercise reduces migraine suffering. The purpose of the study was find out effect of varied intensities of aerobic training on Forced Expiratory Volume in One Second (FEV_1) 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 Forced Expiratory Volume in One Second (FEV_1) variable, computerized spirometer was used to assess Forced Expiratory Volume. 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 & 2	3 & 4	5 & 6	7 & 8	9 & 10	11 & 12	13 & 14	15 & 16
% of Intensity (Watts)	60	65	70	75	80	85	90	95

RESULTS

TABLE - II
ANALYSIS OF COVARIANCE ON FORCED EXPIRATORY VOLUME (FEV_1)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	$\bar{X}$	2.49	2.62	2.53	B	0.12	2	0.06	2.80
	□□	0.15	0.14	0.15	W	0.92	42	0.02	
Post-test	$\bar{X}$	2.62	3.04	2.57	B	2.01	2	1.01	47.40*
	□□	0.16	0.12	0.15	W	0.89	42	0.02	
Adjusted Post-test	$\bar{X}$	2.67	2.98	2.58	B	1.19	2	0.59	139.62*
					W	0.17	41	0.004	

* Significant at 0.05 level of confidence.
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.

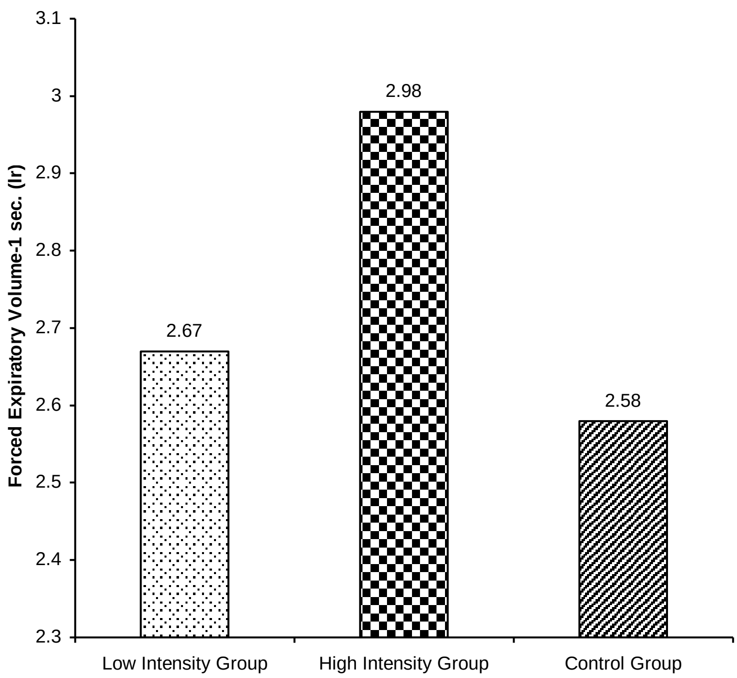
The table II shows that the pre-test means of low and high intensity groups and control group are 2.49, 2.62 and 2.53 respectively. The obtained 'F' ratio of 2.80 for pre-test means of forced expiratory volume-1 sec. is lesser than the table value 3.22 for df 2 and 42 required for significance at 0.05 level. The post-test means of low and high intensity groups and control group are 2.62, 3.04 and 2.57 respectively. The obtained 'F' ratio of 47.40 for post-test means of forced expiratory volume-1 sec. 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 2.67, 2.98 and 2.58 respectively. The obtained 'F' ratio of 139.62 for adjusted post-test means of forced expiratory volume-1 sec. 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 forced expiratory volume-1 sec. 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.

TABLE-III
SCHEFFE'S TEST FOR THE DIFFERENCE BETWEEN THE ADJUSTED POST-TEST PAIRED MEANS OF FORCED EXPIRATORY VOLUME (FEV_1)

Adjusted Post-test Means			Mean Differences	Confidence Interval
Low Intensity Group	**High Intensity Group**	**Control Group**		
2.67	2.98	-	0.31*	0.06
2.67	-	2.58	0.09*	0.06
-	2.98	2.58	0.40*	0.06

* Significant at 0.05 level of confidence.

The table III shows the adjusted post-test mean difference of forced expiratory volume-1 sec. between low intensity and high intensity groups, low intensity and control groups and high intensity and control groups are 0.31, 0.09 and 0.40 respectively, which were greater than 0.06 at 0.05 level of confidence. The results of the study showed that, high intensity aerobic group has significantly differed on forced expiratory volume-1 sec. level when compared to low intensity aerobic and control groups. Low intensity aerobic group also significantly differed on forced expiratory volume-1 sec. level when compared to control group. Hence it was concluded from the results that both high and low intensity aerobic training was better method to increase forced expiratory volume-1 sec. level. Among the training high intensity aerobic training was much better than low intensity aerobic training for increase the forced expiratory volume-1 sec. level. The adjusted post-test mean values of low intensity, high intensity and control groups on forced expiratory volume-1 sec. level were graphically represented to Figure I.



DISCUSSION ON FINDINGS

High intensity aerobic training has significantly improved FEV_1 capacity when compared to low intensity aerobic and control. However low intensity aerobic also improved FEV_1 when compared to control. Hence it was concluded that, both high and low intensity aerobic training may be used to improve FEV_1 of obese people. Further it was concluded that, high intensity aerobic training was the effective method to improve FEV_1 level than low intensity aerobic training. In general huge volume and capacities change little with training, vital capacity increases slightly. At the same time residual volume shows a slight decrease and the changes in these two volumes may be related. Overall, total lung capacity remains essentially unchanged. Following endurance (aerobic) training, tidal volume is unchanged at rest at standardized sub maximal levels of exercise. The responses and adaptations of the respiratory system to prolonged training are considerably less remarkable than those observed in other body system. This lack of adaptation to prolonged activity in the respiratory system is not necessarily all that surprising when one consider the tremendous reserves that accompany the respiratory system, even without physical training. Training response and contribute to lower maximal aerobic power. The reproductive hormones can influence ventilating, substrate metabolism, thermoregulation, and pulmonary function during exercise. Heavy exercises demonstrate greater expiratory flow limitation, an increased work of breathing and perhaps greater exercise induced arterial hypoxemia. 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 FEV_1 (Huang and Osness, 2005). The present study also shows the same (high intensity aerobic training improves better FEV_1 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 (Vusitalo et al., 1998). These adaptations, in which a smaller amount of air is ventilated to provide the same amount of oxygen, are specific to the method of training, but consistent across the intensity of exercise (Marrison,et al., 1986). The findings of shows, maximal exercise improves vital capacity, FEV_1, speak flow rate, FVC, respiratory exchange ratio Sezer (2004). Significant difference was registered in FEV_1 and 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). Revealed that, training using the pulmonary resistance device produced significant increases in maximal VE and maximal VT while decreasing RR at maximum exercise (William and Terry 2002),. Weight loss or aerobic exercise changes static lung volumes in middle-age and older, moderately obese, sedentary men (Christoper *et al.*, 1999). The results of the study may in conformity with the above findings. The results of the study may in conformity with the above findings.

CONCLUSION

High intensity aerobic training was effective method as compared to low intensity training in increasing, forced expiratory volume in one second of middle-aged obese men.

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