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Effect of High and Low Intensity of Aerobic Training on Resting Heart Rate 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. 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 ergometer 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. Heart rate monitor of the biomonitor was used to assess Resting heart rate. 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 shows that High intensity aerobic training best method for reduction resting heart rate, of middle-aged obese men.

Keywords: Low Intensity Aerobic Training, High Intensity Aerobic Training, Resting heart rate, Bicycle Ergo Meter.

Introduction

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. 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. Most of the studies have used aerobic training, several other studies have now used resistance training and have shown impressive decreases in body fat and increase in fat-free mass.

The evidence shows that exercise is an important part of any weight loss program. 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.

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Resting Heart Rate (RHR)

The HR at rest can decrease markedly as a result of ET. In sedentary individuals the RHR would be

80 bpm. RHR decreased by approximately 1 bpm each week for the first few weeks of training. So after 10 weeks of moderate endurance training RHR could drop from 80 to 70 bpm. In a highly controlled study, several hundred subjects 20 weeks of intense ET in previously sedentary individuals resulted in only a small decrease in RHR from 65.0 to 62.4 bpm (Willmore *et al.* 1999),. The purpose of the study was find out effect of High and low intensity of aerobic training on resting heart rate 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 ergometer 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 Resting heart rate), Heart rate monitor of the biomonitor was used to assess Resting heart rate. 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 resting heart rate 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	$\bar{X}$	79.93	76.73	76.47	B	1.64	2	0.82	0.17
	□□	2.58	2.15	1.81	W	203.60	42	4.85	
Post-test	$\bar{X}$	73.93	72.27	76.47	B	134.18	2	67.09	18.84*
	□□	2.52	1.33	1.60	W	149.60	42	3.56	
Adjusted Post-test	$\bar{X}$	73.77	72.25	76.65	B	149.38	2	74.69	91.36*
					W	33.52	41	0.82	

* 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.

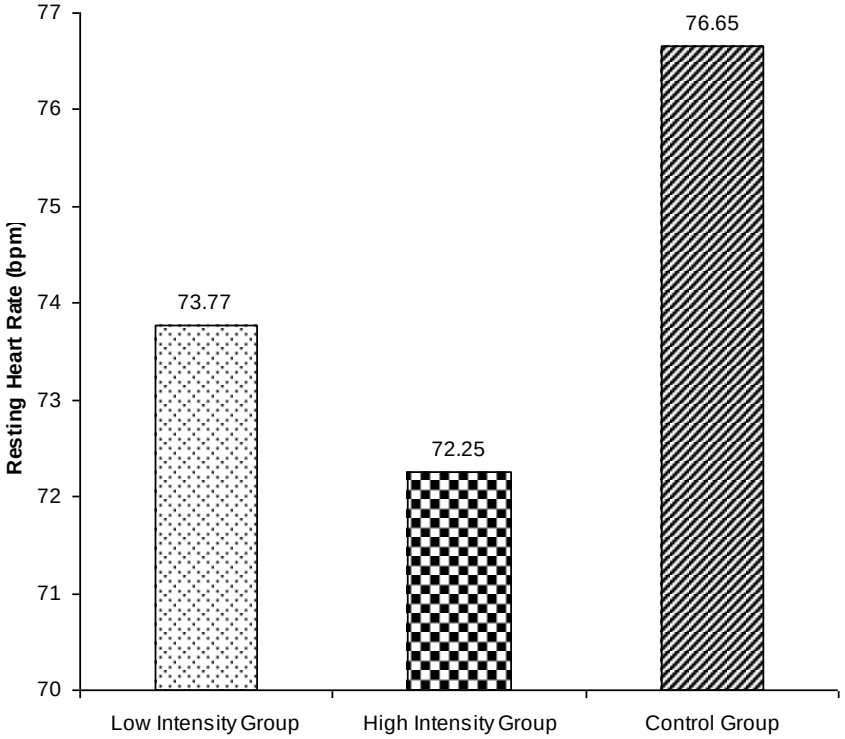
The table II shows that the pre-test means of low and high intensity groups and control group are 79.93, 76.73 and 76.47 respectively. The obtained 'F' ratio of 0.17 for pre-test means of resting heart rate is lesser than the table value 3.22 for df 2 and 42 required for significance at 0.05 level. The post-test means of low and high intensity groups and control group are 73.93, 72.27 and 76.47 respectively. The obtained 'F' ratio of 18.84 for post-test means of resting heart rate 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 73.77, 72.25 and 76.65 respectively. The obtained 'F' ratio of 91.36 for adjusted post-test means of resting heart rate 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 resting heart rate. 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 resting heart rate

Adjusted Post-test Means			Mean Differences	Confidence Interval
Low Intensity Group	High Intensity Group	Control Group		
73.77	72.25	-	1.52*	0.83
73.77	-	76.65	2.88*	0.83
-	72.25	76.65	4.40*	0.83

* Significant at 0.05 level of confidence.

The table III shows the adjusted post-test mean difference of resting heart rate between low intensity and high intensity groups, low intensity and control groups and high intensity and control groups are 1.52, 2.88 and 4.40 respectively, which were greater than 0.83 at 0.05 level of confidence. The results of the study showed that, high intensity aerobic group has significantly differed on resting heart rate level when compared to low intensity aerobic and control groups. Low intensity aerobic group also significantly differed on resting heart rate 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 reduce resting heart rate level. Among the training high intensity aerobic training was much better than low intensity aerobic training for reduce the resting heart rate level. The adjusted post-test mean values of low intensity, high intensity and control groups on resting heart rate level were graphically represented to Figure - I.



Discussion on Findings

Systematically performed physical exercise result in greater changes in the organism. The changes take place on the level of cellular structures, tissues, organs and body build, including levels of cellular auto regulation, hormonal regulation and neural regulation. Most of the training induced changes express adaptation to the conditions of enhanced muscular activity. The top-level adaptation depends on effective training as well as on genetic peculiarities. Different types of activities (Walking, running, cycling, jogging etc.) can be classified as exercise. Each of these activities has varying degrees of muscular movement patterns. An activity can involve 'dynamic' muscular contraction or static muscular contraction or some combination of the two. Several changes related to training have been found in basal hormonal levels. Endurance (aerobic) training increases the level of epinephrine and reduces levels of insulin in the blood. The results shows that High intensity, Low intensity aerobic training positively influences the cardiopulmonary (resting heart rate,) variable of middle-aged obese men. Same results agreement with, found out that 8 weeks of cycling has significantly reduced resting and exercise bradycardia and Vegas modulation during rest and at the absolute exercise work rates (Leicht *et al.* 2003). Concluded that, mechanisms for the reduction of

intrinsic HR following training may include changes in ionic concentrations with the sino-artrial node. Mechanical stretching of the sino-artrial node on a combination of various factors. An increased modulation following intensive exercise training may contribute to the maintenance of bradycardia following the adaptation (Birsen Yavuz et al., 2009). Concluded highly trained endurance athletes heart have adapted to training, by drastically increasing SV, lower HR can provide optimal cardiac out put (Turkvich *et al.* 1988). Endurance athletes has lower HR, greater endocardial fractional shortening and SV (Piocaso, 2000). The HR is one of the simplest and most informative of the cardiovascular parameters. HR reflects the amount of work. The heart must do to meet the increased demands of the body when engaged in activity. In highly conditioned endurance-trained athletes, RHR in range of 28 to 40 beats per minute have been reported (Willmore 1994).

Conclusion

1. High intensity aerobic training was effective method as compared to low intensity training in reducing the resting heart rate of middle-aged obese men.

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