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PHYSICAL EDUCATION

ANALYSIS OF THE CHANGES ON RESTING HEART RATE IN RESPONSE TO DIFFERENT INTENSITIES OF AEROBIC TRAINING AMONG UNTRAINED MEN

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Abstract

For the physiological system of the body to be fit, it must function well enough to support the specific activity that the individual is performing. Moreover, different activities make different demands upon the organism with respect to circulatory, respiratory, metabolic, neurological and temperature regulating functions. The purpose of this study was to find out the effect of different intensities of aerobic training on resting heart rate among untrained men. To achieve the purpose 45 untrained men were randomly selected as subjects in the age group of 40 to 45 years. They were divided into three equal groups and each group consisted of 15 subjects. Group-I underwent moderate intensity aerobic training group-II underwent high intensity aerobic training six days per week for 12 weeks and group-III remained as control. The selected dependent variable resting heart rate was assessed by using Blood Pressure Monitor. Analysis of covariance (ANCOVA) was used to determine the significant difference existing between pretest and posttest on selected dependent variable. The analysis of data revealed that 12 weeks of different intensities of aerobic training had significant impact on resting heart rate of untrained men. However, high intensity aerobic training is significantly better than moderate intensity aerobic training in altering the resting heart rate.

Keywords: Aerobic Training, Resting Heart Rate, Untrained Men.

INTRODUCTION

Everybody wants to stay healthy and happy. It is an easy formula - all one needs to do is indulge in a regular physical activity and follow a balanced diet. One of the surefire ways to ensure fitness is physical exercises. Termed as any long duration exercise of low, moderate to high intensity, aerobics makes use of the large muscle groups of the body such as legs, back, arms etc. These include walking, swimming, running, cycling, dancing, workout on treadmill and rowing machine. The duration of such exercise may extend from 20 minutes to one hour. One can do physical activities, regardless of age. However, the intensity and duration of the exercises will depend upon their stamina and age. Physical exercises result in the improvement of functioning of various organs and systems of the human body.

In this competitive world, many people find it hard to dedicate time for physical activities like exercises, although one of their first priorities is to stay in perfect shape. Most of them told about the importance of aerobics in our daily lives. Without a doubt, aerobics are particularly helpful for weight control. Research consistently shows that regular physical activity, combined with healthy eating habits, is the most efficient and healthful way to control one's weight. Whether one is trying to lose weight or maintain it, one should understand the important role of physical activity and include it in one's lifestyle. Physical activity helps to control one's weight by using excess calories that otherwise would be stored as fat. The number of calories one eats and use each day regulates one's body weight.

A good aerobic exercise program can help to live a longer, healthier life and enhance one's well being. One will get a multitude of benefits if do aerobic workout on a regular basis even if the intensity is low or short in duration. It's fun to keep a log of one's workouts that track progress to see how far one has come in pursuit of fitness. Aerobic exercise is an extended activity that makes one breathe hard while using the large muscle groups at a regular, even pace. Aerobic activities help to make the heart stronger and more efficient. During the early part of exercise, one's body uses stored carbohydrate and circulating fatty acids for energy.

An additional cardiovascular benefit of aerobic exercise is that it helps to normalize blood pressure, especially in people whose blood pressure is somewhat elevated. Aerobic exercise makes the heart stronger and a more efficient pump. Resting heart rate usually decreases after exercise training because the heart can pump more blood per beat. Therefore, it needs to beat fewer times to circulate the amount of blood. In many ways, exercise is the antithesis of aging. Exercise can slow the loss of stamina, strength, flexibility, bone density, metabolic rate and general enthusiasm for being active that seems to go with getting older. Aerobic exercise gives us the ability to maintain an independent lifestyle and increases the likelihood that we will enjoy during post-retirement years (Brehm, 2010).

METHODOLOGY

SUBJECTS AND VARIABLES

To achieve the purpose forty five untrained men were randomly selected as subjects and their age ranged from 40 to 45 years. They were divided into two equal groups and each group consisted of fifteen subjects. Group-I underwent aerobic training five days per week for six weeks only and Group-II remained as a control group. The selected dependent variable resting heart rate was assessed by using Blood Pressure Monitor.

TRAINING PROTOCOL

The experimental groups I and II were performed moderate and high intensity aerobic training alternatively six days in a week for twelve weeks. In this present investigation continuous running was given to the subjects as aerobic training. The method of doing aerobic exercises was explained to the subjects before starting the training. Every week the work out sequence was increased as per the principles of load progression. To fix the training load for the moderate and high intensity aerobic training groups, the subjects were examined for their exercise heart rate in response to different work bouts, by performing continuous running of two minutes duration for proposed repetitions and sets, alternating with active recovery based on work-rest ratio. The subjects training zone was computed using Karvonen formula and it was fixed at 60% HRmax to 75% HRmax for moderate intensity aerobic training and 80% HRmax to 95% HRmax for high intensity aerobic training. The work rest ratio of 1:1 between exercises and 1:3 between sets was given.

STATISTICAL PROCEDURE

In order to nullify the initial mean differences the data collected from the three groups prior to and post experimentation on selected dependent variables were statistically analyzed to find out the significant difference if any, by applying the analysis of covariance (ANCOVA). Since three groups were involved, whenever the obtained 'F' ratio value was found to be significant for adjusted post test means, the Scheffe's test was applied as post hoc test. The level of significance was accepted at $P < 0.05$.

RESULTS

The pre and posttest data collected from the experimental and control groups on resting pulse rate is statistically analyzed by ANCOVA and the results are presented in table-I.

TABLE I
ANALYSIS OF COVARIANCE ON RESTING PULSE RATE OF EXPERIMENTAL AND CONTROL GROUPS

	Moderate IntensityAerobic Training Group	High Intensity Aerobic Training Group	Control Group	S o V	Sum of Squares	Df	Mean squares	'F' ratio
Pre test Mean	70.16	70.53	69.98	B	2.35	2	1.17	0.05
SD	3.60	3.85	6.73	W	1025.09	42	24.40	
Post test Mean	65.32	63.28	70.16	B	594.18	2	297.09	16.59*
SD	3.61	2.34	5.92	W	751.92	42	17.90	
Adjusted Post test Mean	67.31	64.33	70.12	B	580.47	2	290.23	16.50*
				W	721.07	41	17.58	

(The required table value for significance at 0.05 level of confidence with degrees of freedom 2 and 42 is 3.23 and 2 and 41 is 3.22)
**Significant at .05 level of confidence*

Table-I showed that the pre test mean and standard deviation on resting pulse rate of moderate and high intensity aerobic training and control groups are 70.16 ± 3.60, 70.53 ± 3.85 and 69.98 ± 6.73 respectively. The obtained F ratio value of 0.05 for pre test means on resting pulse rate of moderate and high intensity aerobic training and control groups are less than the required table value of 3.23 for the degrees of freedom 2 and 42 at 0.05 level of confidence. It revealed that there is statistically insignificant difference exist among the three groups during pre test period.

The posttest mean and standard deviation on resting pulse rate of moderate and high intensity aerobic training and control groups are 65.32 ± 3.61, 63.28 ± 2.34 and 70.16 ± 5.92 respectively. The obtained F ratio value of 16.59 for posttest means on resting pulse rate of moderate and high intensity aerobic training and control groups are greater than the required table value of 3.23

for the degrees of freedom 2 and 42 at 0.05 level of confidence.

The adjusted posttest means on resting pulse rate of moderate and high intensity aerobic training and control groups are 67.31, 64.33 and 70.12 respectively. The obtained F ratio value of 16.50 on resting pulse rate are greater than the required table value of 3.22 for the degrees of freedom 2 and 41 at 0.05 level of confidence. It is observed from this finding that significant differences existed among the adjusted posttest means of experimental and control groups on resting pulse rate.

Since, the adjusted post test 'F' ratio value was found to be significant the Scheffes test is applied as post-hoc-test to determine the paired mean differences, and it is presented in table-II.

TABLE II
SCHEFFE'S POST HOC TEST FOR THE DIFFERENCES AMONG PAIRED MEANS OF EXPERIMENTAL AND CONTROL GROUPS ON RESTING PULSE RATE

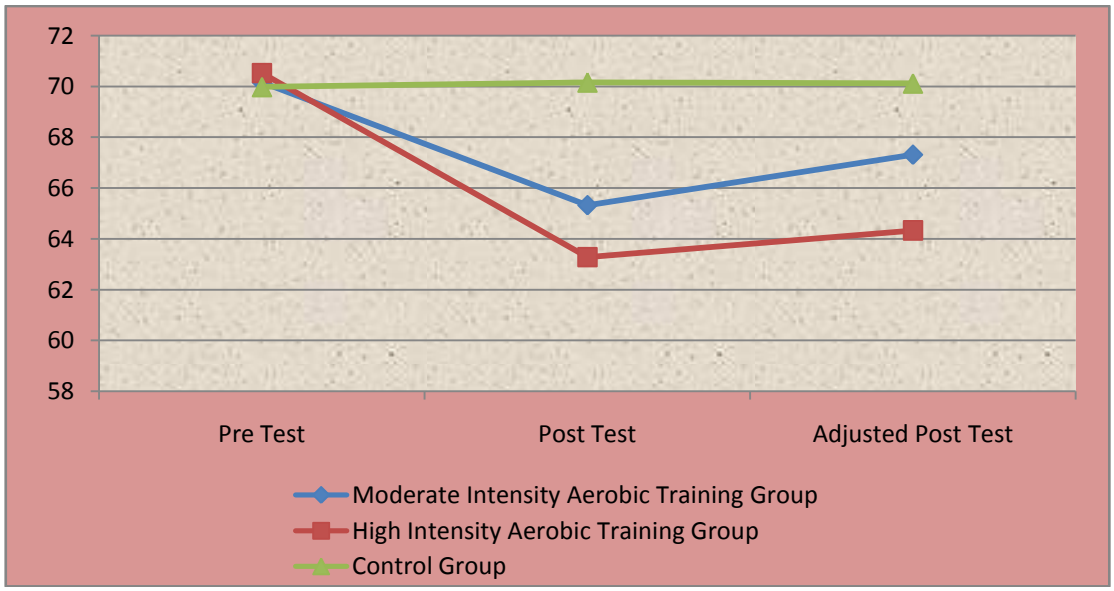
Moderate IntensityAerobic Training Group	High Intensity Aerobic Training Group	Control Group	Mean Difference	Confidence Interval
67.31	64.33		2.98*	2.74
67.31		70.12	3.81*	2.74
	64.33	70.12	6.79*	2.74

**Significant at 0 .05 level*

Table-2 showed that there was significant difference existed between moderate and high intensity aerobic training groups, moderate intensity aerobic training and control groups, high intensity aerobic training and control groups on resting pulse rate. Since, the mean differences 2.98, 3.81 and 6.79 are higher than the confidence interval value of 2.74. It reveals that both experimental groups had significantly improved the resting pulse rate. However, high intensity aerobic training is significantly better than moderate intensity aerobic training in altering the resting pulse rate.

The pre and posttest and adjusted posttest mean values on resting pulse rate of the experimental and control groups is graphically represented in figure-I for better understanding.

FIGURE I
DIAGRAM SHOWING THE MEAN PRE AND POSTTEST AND ADJUSTED POSTTEST MEAN VALUES ON RESTING PULSE RATE OF THE EXPERIMENTAL AND CONTROL GROUPS



DISCUSSION

The main purpose of physical exercise is to increase the circulation of the blood and the intake of oxygen. Depending on the intensity of training, adaptation may occur in the central heart, lungs, and circulation or peripheral within the muscle components. At lower intensities, the physiological adaptations occur primarily in the central component (Cunningham, McCrimmon & Vlach, 1979). Sale (1990) suggested that maximal contractile forces of the heart occur at approximately 75% VO_2max, and consequently the optimal training stimulus for enhancing the

cardiopulmonary system would be at intensity slightly below anaerobic threshold. Balci et al., (2010) inferred that resting heart rate was significantly reduced in both the walk-to-run transition speeds groups. Stone et al., (1991) observed a reduction in pulse rate from training, which is considered beneficial.

The aerobic training increased peak aerobic power by 12% decreased the heart rate and increased all heart rate variability indices at absolute submaximal exercise intensities, but not at rest (Martinmaki et al., 2008). Aerobic exercise training produces significant reduction of systolic and diastolic blood pressure and also significant decrease in the heart rate was registered after the 6-week follow-up cardiovascular rehabilitation, while heart rate was significantly lower in this group compared to group with sedentary lifestyle (Tatjana Ilic et al., 2007*)*.

It is a physiological fact that the human organism needs stimulating exercise. When the whole body is subjected to regular muscular activity, requiring vigorous stress on the heart, lungs and muscles, the general efficiency of physiological functions is being improved. Research now strongly has the theory that regular and vigorous exercise helps to keep the heart healthy and may prevent cardio-vascular diseases. A physically fit person's heart beats at a lower rate and pumps more blood, which denotes the substantial increase of ability to do more physical work. People who keep fit greatly enlarge their fullness of living.

CONCLUSION

It was concluded from the results of the study that the resting heart rate of the untrained men was significantly changed by means of 12 weeks of moderate and high intensities of aerobic training. However, high intensity aerobic training is significantly better than moderate intensity aerobic training in altering the resting pulse rate. Hence, it is suggested that aerobic training is a good way to decrease our resting heart rate and to attain the other metabolic benefits of fitness.

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