EFFECT OF DIFFERENT INTENSITIES OF AEROBIC TRAINING ON STROKE VOLUME OF MIDDLE AGED OBESE MEN

M. Muralikrishna
Assistant Professor, Department of Physical Education and Sports Sciences, Annamalai University
P.V. Shelvam
Professor, Department of Physical Education and Sports Sciences, Annamalai University

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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 stroke volume to assess M-mode Doppler echocardiography and transducer 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 was effective method as compared to low intensity training increasing stroke volume of middle-aged obese men.

***Keywords**: low intensity and high intensity aerobic training, stroke volume, bicycle ergometer*

Health related physical fitness of a patient is dependent on both lifestyle related factors such as daily physical activity levels, nutritional habits and genetic factors, and is an important indicator of health status (Takken, 2003). Low physical fitness is associated with a higher mortality rate, a higher risk of certain forms of cancer, obesity, decreased mental health, diabetes, hypertension, and a lower quality of life (Booth, 2002). 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 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.

Obesity

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. Clarke (1976), the efficiency of an individual in performing physical activities depends basically on his/her cardio respiratory efficiency. Through training the efficiency of the circulatory and respiratory systems are improved. Ehasni *et al.* (1991), felt that after training the LV fills more completely during diastole than it does in an untrained heart. More blood entering the ventricle increases the stretching of ventricular walls. This results in more recoil. Hypertrophy with ET increased contractibility would cause the more blood would be forced out of the heart during the more powerful contractions, leaving less blood in the LV after systole. Increased contractibility coupled with the increased elastic recoil results from greater diastolic filling increase the EF in the trained heart.

Stroke Volume (SV)

ET leads to overall increase in SV. SV at rest is substantially higher after an ET than it is before training. Maximal SV during exercise in untrained subjects is 80 ml/beat to 110 ml/beat. Highly trained subjects have entirely different values than untrained. Their SV is at rest 100 ml/beat to 120 ml/beat at rest during exercise 160 ml/beat to > 220 ml/beat. The purpose of the study was find out effect of different intensities of aerobic training on stroke volume 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 was stroke volume variable, M-mode Doppler echocardiography and transducer was used to assess stroke 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 1

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 2 - Analysis Of Covariance On Stroke Volume 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	MEAN	0.675	0.699	0.674	B	0.006	2	0.003	2.89
	S.D	0.02	0.04	0.03	W	0.042	42	0.001	
Post-test	MEAN	0.850	0.922	0.692	B	0.415	2	0.208	174.82*
	S.D	0.05	0.27	0.02	W	0.05	42	0.001	
Adjusted Post-test	MEAN	0.85	0.92	0.70	B	0.360	2	0.180	170.22*
					W	0.043	41	0.001	

* 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 0.675, 0.699 and 0.674 respectively. The obtained 'F' ratio of 2.89 for pre-test means of stroke volume 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 0.850, 0.922 and 0.622 respectively. The obtained 'F' ratio of 174.82 for post-test means of stroke volume 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 0.85, 0.92 and 0.70 respectively. The obtained 'F' ratio of 170.22 for adjusted post-test means of stroke volume 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 stroke volume. 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 3 - Scheffe's Test For The Difference Between The Adjusted Post-test Paired Means Of Cardiac Output

Adjusted Post-test Means			Mean Differences	Confidence Interval
Low Intensity Group	High Intensity Group	Control Group		
0.85	0.92	-	0.07*	0.03
0.85	-	0.70	0.15*	0.03
-	0.92	0.70	0.22*	0.03

* Significant at 0.05 level of confidence.

The table -III shows the adjusted post-test mean difference of stroke volume between low intensity and high intensity groups, low intensity and control groups and high intensity and control groups are 0.07, 0.15 and 0.22 respectively, which were greater than 0.03 at 0.05 level of confidence. The results of the study showed that, high intensity aerobic group has significantly differed on stroke volume level when compared to low intensity aerobic and control groups. Low intensity aerobic group also significantly differed on stroke volume 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 stroke volume level. Among the training high intensity aerobic training was much better than low intensity aerobic training for increase the stroke volume level.

Discussion on Findings

High and low intensity aerobic training has significantly improved stroke volume, when compared to control. However between the training significant differences was found infavour of high intensity aerobic training on stroke volume. Hence it was concluded that high and low intensity aerobic exercises positively influence stroke volume. Further it was concluded, high intensity aerobic training was the best method to improve stroke volume for obese people. The results shows that High intensity, Low intensity aerobic training positively influences the cardiopulmonary (Stroke volume) variable of middle-aged obese men. Same results agreement with that Concluded, highly trained endurance athletes tend to have lower, maximum HR values. Their heart has been adapted to training by drastically increasing their SV, so lower HR, maximum values can provide optimal cardiac output (Turkvich *et al.* 1988),. Found that in contrast, athletes achieved a substantially increased $\dot{Q}$ basically through a prominent increase SV, their exercise HR was similar to that of sedentary individuals. The greatly increased SV resulted from both increases in end-diastolic volume and marked decreases in end-systolic volume compared with those in sedentary persons. These volumetric changes were reflected in a striking increase in ejection fraction (Henriksen, E. *et al.* 1999). Physical training improves SV and cardiac enlargement (Whyte *et al.,* 2004). Short term aerobic training alone influence several physiological improvements on cardiovascular function in humans (Yang *et al.,* 2010). When muscles demand for O_2 during exercise the increase directly. When the level of exercise exceeds 40%, 60% of the individual capacity SV has either plateau or begun to increase at a much slower rate. Thus further increase in are largely the results of increase in HR (Willmore 1996). According to the cardiovascular system accomplishes this by increasing and redistributing blood flow to the active muscle via neural regulations of the hemodynamic responses and local regulation of the flow within the active muscle. This local blood (250 to 400 ml/ 100g/min) neural regulations of the cardiovascular system regulates hemodynamics responses by increasing HR, SV, and O_2 extraction at the tissue level (Richard Allen 1999). 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 increasing stroke volume of middle-aged obese men.

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