EFFECT OF VARIED INTENSITY AEROBIC TRAINING ON Vo$_{2\,max}$ OF COLLEGE WOMEN STUDENTS

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Short Profile

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ABSTRACT:

Purpose: To determine whether the varied intensity aerobic training differently affecton VO$_{2max}$ of college women students. Methods: The subjects for the study were selected from Idhayacollege of arts and science for women, Puducherry. The subjects were selected randomly and their age ranged between 17 to 21 years. They were divided into three different groups namely group I as moderate intensity (55% to 70% HRR), group II as high intensity (70% to 85% HRR), group III as control group. Intensity during exercise was controlled by having the subjects maintain target HR based on HR reserve. Exercise volume (and thus energy expenditure) was controlled across the two training groups by varying duration. Results:VO$_{2max}$ significantly increased in all exercising groups. Conclusion:When volume of exercise is controlled, lower intensities of exercise are more effective for improving VO2max than higher intensities of exercise among healthy, young adults.

KEYWORDS
Women Students , physical fitness , Testing procedures and material.

INTRODUCTION:

Cardio respiratory endurance has long been recognized as one of the fundamental components of physical fitness. VO$_{2\,max}$ is probably the single most important factor determining success in an aerobic endurance sport . Cardio respiratory fitness is increased by exercise training, regardless of age, gender, race, and initial fitness level. Research suggests that vigorous-intensity exercise (60–84% oxygen consumption reserve results in greater increases in aerobic capacity than moderate-intensity exercise (40–59% O2R). On the other hand, other guidelines suggest that changes in cardio respiratory fitness are similar in high and moderate-intensity interventions if the energy cost of exercise is similar. However, those randomized controlled trials that have compared interventions of equal energy cost have concluded that high-intensity training is more effective in improving cardio respiratory fitness.

MATERIALS AND METHODS

Female students were selected from Idhayacollege of arts and science for women, Puducherry and they were studying undergraduate students. Their age ranged between 17 to 21 years. They were divided into three different groups namely group I as moderate intensity (55% to 70% HRR), group II as high intensity (70% to 85% HRR), group III as control group. Intensity during exercise was controlled by having the subjects maintain target HR based on HR reserve. Exercise volume (and thus energy expenditure) was controlled across the two training groups by varying duration. Subjects signed a statement of informed consent.

TESTING PROCEDURES AND MATERIAL:

After screening, subjects were randomly assigned to easy zone group, steady zone group, tempo zone group and control group. All participants were instructed not to change their dietary or lifestyle habits. The subjects were familiarized with Harvard step test twice before the start of the study. They started with a warm-up period and terminated with a cool-down of 5 min. The intensity levels for training were chosen because they are in keeping with those recommended for the improvement of cardio respiratory fitness.

TRAINING PROTOCOL:

Subjects randomly assigned to one of three groups: moderate intensity group, high intensity group and control group. Each training groups were divided into three phases namely Phase I, Phase II and Phase III and each phase consists of four weeks. Group I were given aerobic training ranging from 55% to 70% severity of their maximum heart rate, by keeping the volume constant at thirty minutes in all the phases. The aerobic training with varied intensity level from 70% to 85% severity of their maximum heart rate.The intensity of the exercise program for all training groups was gradually and progressively increased, based on their tolerance, to induce a training effect throughout the training programe. All the experimental groups were given training for five days per week for a period of twelve weeks. In the training sessions, the subjects were asked to do warm-up for 5 minutes and then they were asked to do their respective training programe. After the completion of the training, the subjects were asked to warm down for 10 minutes as a recovery process in order to avoid injuries. The warm up and cool down period not included in the training duration.

STATISTICAL ANALYSIS:

All data were analyzed using SPSS for Windows, version 11.0. Descriptive statistics are presented as mean and SD. Effects of training on the principle dependent variable VO$_{2\,max}$ were analyzed using ANCOVA. For significant F-ratio, Scheffe's post hoc test was used to determine which group means differed from each other. Statistical significance was set at the 0.05 level.

RESULTS AND DISCUSSION

The detailed procedure of analysis of data and interpretation are given below.

TABLE-I
ANALYSIS OF VARIANCE FOR EXERCISE GROUPS AND
CONTROL GROUP ON VO$_{2\,Max}$

Test	Group I	Group II	Control Group	SOV	Sum of squares	df	Mean squares	'F' ratio
Pre test	33.52	33.53	33.58	B	0.033	2	0.017	0.036
S.D	0.671	0.622	0.729	W	19.198	42	0.457	
Post test	37.04	35.52	33.26	B	108.594	2	54.297	138.649*
S.D	0.690	0.516	0.656	W	16.448	42	0.392	
Adjusted Post test	37.05	35.52	33.24	B	110.162	2	55.081	186.898[*]
				W	12.083	41	0.295	

*Significant at 0.05 level.
Required table value at 0.05 level of significance for 2 & 42 degrees of freedom = 3.22

From the above Table is found that the f ratio for the pre-test mean on VO$_{2\,Max}$ is 0.036. There is no significant difference between the three groups, since the calculated 'f' value is less than the required table value 3.22. For the post test mean on VO$_{2\,Max}$ the f value is 138.649 which is found to be significant since, the calculated 'f' value is greater than the required value 3.22 at 0.05 level of significance.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated. The adjusted post test means of exercise groups and control group are 37.05, 35.52 and 33.24 respectively. For the adjusted post test mean on VO$_{2\,Max}$ the f value is 186.898, which is found to be significant. Since the calculated 'f' value is higher than the required table value 3.22 at 0.05 level of significance.

The above results reveal that significant difference exists among the adjusted post test means of exercise groups and control group. Further to determine which of the paired means had a significant difference, Scheff's post-hoc test is applied and the results are presented in the Table II.

Table II
Scheff's test for the differences between the paired adjusted post test means on $VO_{2\,Max}$.

Group I	Group II	Control	Mean Difference	CI
37.05	35.52		1.53[*]	
37.05		33.24	3.81[*]	0.50
	35.52	33.24	2.28[*]	

There were no significant differences observed atbaseline between any of the groups. During the 12-week study, subjects in theexercise groups were required to attend the exercise sessions regularly.
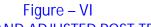
Table II shows the difference between paired adjusted means on $VO_{2\,max}$. The confidence interval value at 0.05level is 0.50. The adjusted post test mean difference on $VO_{2\,max}$ between group I and group II is 1.53which is found to be greater than the required confidence interval value hence it is significant at 0.05 level of significance. The adjusted post test mean difference between group II and control is3.81 is greater than the required confidence interval value hence it is found to be significant at 0.05 level. The adjusted post test mean difference between group II and control group is 2.28 is greater than the required confidence interval value hence it is found to be significant at 0.05 level of significance.

The above results indicate that the training intervention groups namely group I and group II have significantly improved their $VO_{2\,max}$, when compared to the control group.

It is also indicated that $VO_{2\,max}$ for group I is significantly reduced when compared to the other groups.

The mean values of pre-test, post-test and adjusted post-test of training intervention groups and control group of $VO_{2\,max}$ are graphically represented in the Figure I .

Figure – VI
THE PRE TEST, POST TEST AND ADJUSTED POST TEST MEAN VALUES OF
VARIED INTENSITY AEROBIC TRAINING GROUPS AND CONTROL GROUP ON $VO_{2\,max}$

	Group I	Group II	Control Group
Pre test	33.52	33.53	33.58
Post test	37.04	35.52	33.26
Adjusted Post test	37.05	35.52	33.24

DISCUSSIONS ON THE FINDINGS OF $VO_{2\,max}$

The result introduced in Table I showed that obtained adjusted means on $VO_{2\,max}$ among group I and group II are 37.05 and 35.52 and the mean value of control group is 33.24. The differences among pretest scores, post test scores and adjusted mean scores of the subjects were statistically analysed

using ANCOVA and the 'F' values obtained were 0.036, 138.649 and 186.898 respectively. It was found that obtained 'F' value on pre test scores is not significant and the obtained 'F' values on post test and adjusted post test means were significant at 0.05 level of significance as these values were greater than the required table value of 3.22.

The Scheffe's post hoc analysis proved that due to twelve weeks of varied intensity, aerobic training has significant improvement on $VO_{2\,max}$ and the control group did not show any significant result. This indicates that the training program is having a positive influence towards $VO_{2\,max}$ of the subjects.

Further while comparing among training intervention groups it is found that low intensity with high volume group has significantly improved their $VO2_{max}$. Hence, it is concluded that 65% - 80% intensity aerobic training are better in maintaining $VO_{2\,max}$.

The twelve week varied intensity aerobic training led to a significant improvement of VO2 max in training intervention groups which adapts to the results of Gormley, (2008). He showed that aerobic activities with 60 – 79% of maximal heart rate in three sessions, 60- 70 minutes a day for sixteen weeks. $VO_{2\,max}$ showed a significant improvement in experimental group compared to pre training. No significant difference was observed in control group for pre and post training program.

CONCLUSION

The present randomized controlled study of exercise showed a significant increase in $VO_{2\,max}$ in moderate intensity and low-vigorous intensity groups over the 12-weeks studyperiod. The study demonstrated a potential benefit of moderate continuous exercise to improve of cardio respiratoryfitness in young females.

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