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Effect of Aerobic Training Resistance Training and Concurrent Training on VO_2 Max among College Boys

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ABSTRACT: *The purpose of the study was to find out the effect of aerobic training, resistance training and concurrent training on Vo_2 max among college boys. To achieve this purpose of the study, sixty college students were selected as subjects who were from the Nagaland University. The selected subjects were aged between 18 to 22 years. They were divided into four equal groups of fifteen each, Group I underwent aerobic training, Group II underwent resistance training, Group III underwent concurrent training and Group IV acted as control that did not participate in any special training apart from their regular curricular activities. The subjects were tested on selected criterion variable such as vo_2 max prior to and immediately after the training period. The selected criterion variable such as vo_2 max was determined through using Treadmill. The analysis of covariance (ANCOVA) was used to find out the significant differences if any, between the experimental group and control group on selected criterion variable. In all the cases, 0.05 level of confidence was fixed to test the significance, which was considered as an appropriate. The result of the present study has revealed that there wasa significant difference among the experimental and control group on vo_2 max.*

Keywords: aerobic training, resistance training, concurrent training, vo_2 max.

INTRODUCTION

The primary objective of sports training is to stress various bodily systems to bring about positive adaptation in order to enhance sporting performance. To achieve this objective, coaches and athletes systematically apply a number of training principles including overload, specificity and progression, organized through what is commonly termed periodization. The application of these principles involves the manipulation of various programme design variables including choice of exercise, order of training activities/exercises, training intensity (load and repetition), rest periods between sets and activities/exercises and training frequency and volume in order to provide periods of stimulus and recovery, with the successful balance of these factors resulting in positive adaptation. Aerobic exercise refers to exercise that involves or improve oxygen consumption by the body. Aerobic training increased cardio-respiratory endurance, which in turn increased Vo_2 max, because of it increased level of hemoglobin. Resistance training is an integral part of an adult fitness program and of a sufficient intensity to enhance strength, muscular endurance and maintain fat free mass. Resistance training involves exercise in which the muscles exert a force against an external load. It is most commonly referred to as weight training. Such a training program should be individualized, progressive and specific in terms of the way muscles are likely to be used in the chosen sport. The physiological response to dynamic aerobic exercise is an increase in oxygen consumption and heart rate that parallels the intensity of the imposed activity and a curvilinear increase in stroke volume. The cardiovascular system, composed of the heart, blood vessels and blood responds predictably to the increased demands of exercise. With few exceptions, the cardiovascular response to exercise is directly proportional to the skeletal muscle oxygen demands for any given rate of work and oxygen uptake increases linearly with increasing rates of work. A person's maximum oxygen uptake is a function of cardiac output multiplied by the arterial-mixed venous oxygen difference. Cardiac output thus plays an important role in meeting the oxygen demands for work. As

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the rate of work increases, the cardiac output increases in a nearly linear manner to meet the increasing oxygen demand, but only up to the point where it reaches its maximal capacity.

Maximal Oxygen Consumption (VO_2 Max)

VO_2 max (also maximal oxygen consumption, maximal oxygen uptake, peak oxygen uptake or maximal aerobic capacity) is the maximum rate of oxygen consumption as measured during incremental exercise, most typically on a motorized treadmill. Maximal oxygen consumption reflects the aerobic physical fitness of the individual, and is an important determinant of their endurance capacity during prolonged, sub-maximal exercise. The name is derived from V - volume, O_2 - oxygen, max - maximum. VO_2 max is expressed either as an absolute rate in (for example) liters of oxygen per minute (L/min) or as a relative rate in (for example) milliliters of oxygen per kilogram of body mass per minute (e.g., ml/(kg·min)). The latter expression is often used to compare the performance of endurance sports athletes.

METHODOLOGY

In the present study all the students studying in higher educational institutions' of Nagaland University area were considered as population for the study. A representative sample of 60 college students in the age of 18-22 years was chosen as sample for the study. The selected participants were divided into four groups. Group I underwent aerobic training, group II underwent resistance training, group III underwent concurrent training and group IV act as control group. The experimental groups underwent eight weeks of training in their particular workout. For this study dependent variable is vo_2 max. 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.

2.1 Measurement of vo_2 max

VO_2 max (maximal oxygen uptake) was predicted using a sub maximal treadmill test on a motor driven treadmill. The test began at a speed with which each subject could jog comfortably. After 3 minutes when a steady state heart rate (HR) was achieved, the speed and heart rate was recorded VO_2 max was predicted using the following formula.

The estimated VO_2 max can be calculated in ml/kg/min.

VO_2 max = 54.07 – 0.1938 × Body weight + (4.47 × Speed/1.6) – 0.1453 × heart rate + 7.62 × gender

where: speed = km/h
gender = 1 for men, 0 for women
body weight = kg.

2.2 Analysis of Data

The data obtained were analyzed by analysis of covariance (ANCOVA). Analysis of covariance was computed for any number of experimental groups, the obtained 'F' ratio compared with critical F value for significance. If obtained 'F' ratio significant scheffe's post hoc test were used.

RESULTS

The statistical analyses of Vo_2 max due to aerobic training, resistance training and concurrent training have been presented in Table I.

TABLE – I

COMPUTATION OF ANALYSIS OF COVARIATION ON VO_2 MAX

TEST	E.G. I	E.G. II	E.G. III	C.G.	F
PRE TEST	37.45	37.25	37.83	38.47	1.46
POST TEST	42.59	41.21	42.16	38.33	19.27*
ADJUSTED	42.85	41.65	42.09	37.70	124.88*

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The table I shows that the pre-test values on vo_2 max for aerobic training, resistance training, concurrent training and control groups were 37.45, 37.25, 37.83 and 38.47 respectively. The obtained 'F' ratio value of 1.46 for pre-test score of aerobic training, resistance training, concurrent training and control groups on vo_2 max was less than the required table value of 2.70 for significance with df 3 and 56 at 0.05 level. The post-test means of vo_2 max for aerobic training, resistance training, concurrent training and control groups were 42.59, 41.21, 42.16 and 38.33 respectively. The obtained 'F' ratio value of 19.27 for post-test scores of aerobic training, resistance training, concurrent training and control groups was more than the required table value of 2.70 for significance with df 3 and 56 at 0.05 level. The adjusted post-test means of vo_2 max for aerobic training, resistance training, concurrent training and control groups were 42.85, 41.65, 42.09 and 37.70 respectively. The obtained 'F' ratio value of 124.88 for adjusted post-test scores of aerobic training, resistance training, concurrent training and control groups were higher than the required table value of 2.72 for significance with df 3 and 55 at 0.05 level. The results of the study indicate that there is a significant difference between vo_2 max for aerobic training, resistance training and concurrent training after respective training for a period of 8 weeks, Scheffe's post-hoc test was applied and the results are presented in Table –II.

Table II

SCHEFFE'S TEST FOR THE ADJUSTED POST-TEST PAIRED MEANS OF VO2 MAX

Adjusted Post-Test Means				Mean Diff.	Class Interval
AT	RT	CT	CG		
42.85	41.65			1.20*	0.81
42.85		42.09		0.75	
42.85			37.70	5.14*	
	41.65	42.09		0.45	
	41.65		37.70	3.95*	
		42.09	37.70	4.39*	

The results presented in table II shows that the mean difference between aerobic training group and resistance training group was 1.20, aerobic training group and control group was 5.14, resistance training group and control group was 3.95 and concurrent training group and control group was 4.39, which were higher than the required confidence interval value of 0.81. However, all the experimental groups have significant difference when compare to the control group and also there was a significant difference between aerobic and resistance training group. There was no significant difference between the aerobic resistance training group and concurrent training group and also resistance training group and concurrent training group.

DISCUSSION/CONCLUSION

The results of analysis of covariance on vo_2 max showed that there was a significant difference existed between control group and aerobic training, resistance training and concurrent training groups. Thus, eight weeks of experimental treatment reduction in vo_2 max of the college boys compared to control group, aerobic training was found to be significantly better than resistance training and concurrent training. The above findings are in consonance with the study conducted by Mughal and others and Zabihoiah Tarasi and others.

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