

STUDIES ON EFFECT OF AEROBIC TRAINING ON VO₂ MAX

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Abstract: An adequate supply of oxygen is necessary for normal life activity. Cells use this oxygen supply for oxidative process in the metabolic changes. The enhanced metabolism rates demands more oxygen supply. Hence oxygen consumption is an important aspect detecting athletes working ability. Thus physiological VO_{2max} assessment is the marker of functional state of respiratory, circulatory and metabolic system.

The present research was intended to examine the effects of aerobic training on VO_{2max} of 14-16 year old male adolescents. The total 12 weeks aerobics training indicated variable effects in increasing the VO_{2max} and no changes among the body structural aspect like the height, weight and surface area of the subject are discussed in the present paper.

Key words : Aerobic training , VO_{2max}, Adolescent males

INTRODUCTION

An adequate supply of oxygen is necessary for normal life activity. Cells use this oxygen supply for oxidative process in the metabolic changes. The enhance metabolism rates demands more O₂ supply. Hence oxygen consumption is an important aspect detecting athletes working ability and sports performance. Thus, Psychological VO_{2max} assessment is the marker of functional state of respiratory, circulating and metabolic system [1].

Maximal oxygen uptake decreases by ~10% in secondary people after the age of 25 yrs. (O. Inbar & others 1994). Further decline is ~15% between the age of 50 & 75 yrs. However, for masters athletes a decline of some 5% decrease in the maximum oxygen uptake has been reported. Equally, the role of regular aerobic exercise in the prevention and restoration of the muscles metabolic & vascular losses usually increased in the aging process [2-3]. Also it is reported that, when individual adopts to endurance exercise, both his VO_{2max} and the concentration of mitochondria in the skeletal muscles increased. Thus increase in muscle mitochondria can play a significant role in the increase of VO_{2max}. Insufficient information is available on the exact role of mitochondria in enhancement of VO_{2max} in adolescent males. Hence present investigation was carried out so as to determine the efficacy of Volume of oxygen consumption in adolescent males which may assist to provide guidelines in designing the physical fitness schedule.

Methods

Subjects:- The untrained healthy adolescent male were screened and thus considered for the study from Kendriya Vidyalaya Puri, Orissa, India. All the selected volunteers consented were considered healthy, if they were not presently taking any medication. A thorough orientation of the experimental procedure *vis-à-vis* exercise schedule and laboratory testing were explained to them. Total 30 subjects to 14 -16 yrs age participated in a voluntary programme of 12 weeks of aerobic training which included jogging and running. Experimental design was statistically worked out in which the thirty subjects were randomly divided into one experimental and the other normal group consisting of 15 each subjects. Jogging and running were prescribed as a means of aerobic training while control group did not participate in any of these endurance.

Exercise protocol: - Volume of oxygen consumption in adolescent males was performed following the procedures of Fox (1981) . The method is based on directly measuring VO_{2max} to the submaximal heart rate (HR_{sub}) response recorded during the 5th minute of bicycle exercise at 150 watts with 50 revolution per minute. For which the equation of estimation is as follows.

$$\text{That is } VO_{2max} = 6.3 - 0.0193 * HR_{sub}$$

Also, the weight, height and age of the subjects was recorded using standard physical laboratory procedures. Age was recorded in years, the reading of height was taken in nearest centimeters, while the measurement of weight was measure in Kgs. Equally the body surface area was calculated for height and weight of the subject with the help of standard normgram of Boothby and sandiford (1920)

The training schedule was strictly followed thrice a week in the morning session of Mondays, Wednesdays and Fridays for which getting & the training method included the gradual increase of 3 minutes after every 2 weeks considering that the duration of 2 weeks was sufficient for adaptation of the body.

RESULTS & DISCUSSION

The subject in the present investigation underwent measurements of submaximal and maximal oxygen uptake and thus heart rate during exercise on a cycle ergometer for which the rebulb are summerised on upper.,

SIGNIFICANCE OF DIFFERENCE BETWEEN THE PRE-TEST AND POST-TEST MEANS OF THE EXPERIMENTAL AND CONTROL GROUPS IN VO_{2max} .

Group	Pre-test Mean	Post-test Mean	Mean-difference	SEDM	t-ratio
Control	2.58	2.59	.01	.01	1
Experimental	2.59	2.884	.294	.04	7.35*

*significant at .05 level

$t_{.05}^{(29)} = 2.04$.

PAIRED ADJUSTED FINAL MEANS AND DIFFERENCE BETWEEN MEANS OF THE EXPERIMENTAL AND CONTROL GROUPS IN VO_{2max} .

Experimental group	Control group	Mean difference	Critical difference
2.880	2.598	.282*	.0085

*significant at .05 level.

We absorbed that the experimental group in VO_{2max} was 7.35 which was significant or it was greater then the t-Value of 2.04 required for significant at 0.05 level. However, the t-ratio for the control group was found to be 01, which was not significant at 0.05 level. Also, the paired adjusted final means & difference between means of the experimental & control groups in VO_{2max} 0.282 which was greater than the critical difference value of 0.0085 and hence, the 2 groups differed significantly with respect to VO_{2max} .

The present exercise observed no changes among the body structural aspects like the height, body weight and body surface area for both the groups. The reason may be the duration of the training period.

Cardio-respiratory efficiency of which is one of the key factors was measured in coupling submaximal heart rates (HR_{sub}) and volume of maximal oxygen uptake capacity (VO_{2max}) of the subject. The significant reduction of HR_{sub} of experimental subject may be due to the adaptation of the energy cost of rest and submaximal work load. The result of our present investigation are in agreement with the result of Mathews and Fox 1976, 1981, Ekblom, M. Frick [4-7].

The significant increase in VO_{2max} of the experiment group following training may be due to the supply of O_2 to the active tissues thus maintaining coordination to integrate with the work of muscles to attain the body to its highest efficiency. Some of the main reason for this are increase in the quality of muscle mitochondria to fulfill its O_2 transport capacity and thus unloading of O_2 at tissue level during exercise followed by ventilation of lungs which ordinarily increases the load of work.

In conclusion, the subject in the present study exhibited significant increase in the VO_{2max} of the experiment group. This may be due to the adaptation to training in case of experimental subjects. Thus, our results are in good agreement with the result of Olson and Preolot Astrand [3,8].

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