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Research Article

Studies on effect of aerobic training on Vo_2 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 demand more oxygen supply, hence. oxygen consumption is an important aspect detecting athletes working ability. Thus, physiological VO_2 max 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_2 max of 14-16 year old male adolescents. The total 12 weeks aerobics training indicated variable effects in increasing the VO_2 max and no changes among the body structural aspects like the height, weight and surface area of the subject as discussed in the present paper.

■ **Key Words :** Aerobic training , VO_2 max, Adolescent males

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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 O_2 supply. Hence, oxygen consumption is an important aspect detecting athletes working ability and sports performance. Thus, psychological VO_2 max assessment is the marker of functional state of respiratory, circulating and metabolic system (David N. Proctor *et al.,* 1998).

Maximal oxygen uptake decreases by ~10 per cent in secondary people after the age of 25 yrs. (Inbar *et al.,* 1994). Further decline is ~15 per cent between the age of 50 and 75 yrs (Shvartz and Reibold, 1990). However, for masters athletes a decline of some 5 per cent decrease in the maximum oxygen uptake has been reported (Rogers *et al.,* 1990). Equally, the role of regular aerobic exercise in the prevention and restoration of the muscles metabolic and vascular looses usually increased in the aging process (Astrand *et al.,* 1964 and Booth *et al.,* 1994). Also it is reported that, when individual adopts to endurance exercise, both his VO_2 max 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_2 max. Insufficient information is available on the exact role of mitochondria in enhancement of VO_2 max in adolescent males. Hence, the 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.

■ METHODOLOGY

Subjects :

The untrainined 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_2 max 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 :

That is Vo2 max = 6.3 – 0.0193 HRsub*

Also, the weight, height and age of the subjects were 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 kg. Equally the body surface area was calculated for height and weight of the subject with the help of standard normgram.

The training schedule was strictly followed thrice a week in the morning session of Mondays, Wednesdays and Fridays for which getting and 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.

■ OBSERVATIONS AND 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.

It was absorbed that the experimental group in VO_2 max was 7.35 which was significant or it was greater then the t-value of 2.04 required for significance at 0.05 level. However, the t-ratio for the control group was found to be 1, which was not significant at 0.05 level (Table 1).

Table 1: 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	SED M	t-ratio
Control	2.58	2.59	0.01	0.01	1
Experimental	2.59	2.884	0.294	0.04	7.35*

* Indicate significance of value at P=0.05, respectively $t_{.05}^{(29)} = 2.04$.

The paired adjusted final means and difference between means of the experimental and control groups in VO_2 max 0.282 was greater than the critical difference value of 0.0085 and hence, the two groups differed significantly with respect to VO_2 max (Table 2).

Table 2 : Paired adjusted final means and difference between means of the experimental and control groups in Vo_2 max*

Experimental group	Control group	Mean difference	Critical difference
2.880	2.598	0.282*	0.0085

*Indicate significance of value at P=0.05, respectively

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 is one of the key factors as measured in coupling submaximal heart rates (HRsub) and volume of maximal oxygen uptake capacity (VO_2 max) of the subjects. The significant reduction of HR sub of experimental subjects may be due to the adaptation of the energy cost of rest and submaximal work load. The result of the present investigation are in agreement with the result of Mathews and Fox (1981).

The significant increase in VO_2 max of the experiment group following training may be due to the supply of O_2 to the active tissues thus maintaining the coordination to integrate with the work of musses to attain the body to its highest efficiency. Some of the main reasons 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 excise followed by ventilation of lungs which ordinarily increases the load of work.

In conclusion, the subjects in the present study exhibited significant increase in the VO_2 max of the experiment group. This may be due to the adaptation to training in case of experimental subjects. Thus, the present results are in good agreement with the result of Olson (1967), Holloszy (1981) and Astrand (1964).

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