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Impact of Different Intensities of Interval Training on Maximum Oxygen Consumption

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Abstract

The purpose of this study was to examine the effect of different intensities of interval training on maximum oxygen consumption. Sixty subjects were selected and they were divided into four equal groups of fifteen each. The first group performed low intensity interval training, second group performed medium intensity interval training, third group performed high intensity interval training and the fourth group acted as control. The pre and posttest data on maximum oxygen consumption was statistically analyzed by applying the analysis of covariance (ANCOVA). Statistical analysis found significant improving in maximum oxygen consumption due to different intensities of interval training.

Keywords: Interval training, Maximum oxygen consumption.

Introduction

Intensity, the qualitative component of work an athlete performs in a given time, is also an important component of training. The more work the athlete performs per unit of time, the higher the intensity. Intensity is a function of the strength of the nerve impulses the athlete employs in training. The strength of a stimulus depends upon the load, speed of performance, and the variation of intervals or rest between repetitions. Muscular work and central nervous system involvement through maximum concentration determine the intensity during training or competition. Intensity varies according to the specifics of the sport, because the level of intensity varies in most sports and games. It is important to establish and use varying degrees of intensity in training. Several methods are available to measure the strength of the stimuli and thus the intensity (Bomba, 1999). Interval training is a method of overloading the athlete by the use of aerobic and anaerobic exercises, thus developing a high oxygen debt. A quick recovery of cardiovascular and respiratory systems is sought for and expected. In this method, an athlete runs a prescribed course in a specified time for a prescribed number of times. Fast runs are interspersed with short recovery periods of jogging. The athlete becomes fatigued many times in a single training session, depending on his ability to handle many states of high oxygen debt. Besides developing speed and endurance, interval training has the added advantage of allowing large numbers of athletes to train at the same time (Novich & Taylor, 1983). The aim of the present study is to assess the effect of different intensities of interval training on maximum oxygen consumption.

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Methodology

To achieve the purpose of the study, sixty male students from SCSVMV University, Kanchipuram, Tamilnadu were selected as subjects at random. The age of the subjects ranged from 18 to 22 years. The selected subjects were randomly assigned to one of the four groups. The experimental group-I underwent low intensity interval training, experimental group-II underwent medium intensity interval training, group-III underwent high intensity interval training and group-IV acted as control. The data on maximum oxygen consumption was collected by administering one mile run test. Pretest data were collected prior to the training programme and posttest data were collected immediately after the twelve-weeks of training programme from both the experimental groups and control group.

Training protocol

The experimental groups underwent their respective training programme three days per week (alternate days) for twelve weeks. The first group performed low intensity interval training, second group performed medium intensity interval training and third group performed high intensity interval training. To fix the training load for the experimental groups the subjects were examined for their exercise heart rate in response to different work bouts, by performing continuous running of two minutes duration for proposed repetitions and sets, alternating with active recovery based on work-rest ratio. The subject's training zone was computed using Karvonen formula and it was fixed at 50%HRmax to 65%HRmax for low intensity interval training, 65%HRmax to 80%HRmax for medium intensity

interval training and 80%HRmax to 95%HRmax for high intensity interval training. The work rest ratio of 1:1 between exercises and 1:3 between sets was given.

Statistical Technique

The data collected from the four groups prior to and post experimentation on maximum oxygen consumption was statistically analyzed to find out the significant difference if any, by applying the analysis of covariance (ANCOVA). Whenever the obtained F ratio value was found to be significant for adjusted posttest means, the Scheffe's test was applied as post hoc test. The analysis of data on maximum oxygen consumption is presented in table 1 and 2.

Table 1
Analysis of Covariance on Maximum Oxygen Consumption

	Low Intensity Interval Training	Medium Intensity Interval Training	High Intensity Interval Training	Control Group	S o V	SS	df	MS	'F' ratio
Adjusted Post test Mean	2.83	3.12	3.31	2.14	B	11.28	3	3.76	106.73*
					W	4.80	55	0.08	

The required table value for significance at 0.05 level of confidence with degrees of freedom 3 and 55 is 2.77.

The result of the study shows that, significant differences exist among the adjusted post-test means of experimental and control groups on maximum oxygen consumption. Since, the obtained 'F' ratio value for the adjusted post-test means was found to be significant, the Scheffe's post hoc test was applied, and the results are presented in table-2.

Table 2
Scheffe's Test for the Differences among Paired Means of Experimental and Control Groups on Maximum Oxygen Consumption

Low intensity interval training group	Medium intensity interval training group	High intensity interval training group	Control group	Mean difference	Confidence interval
2.83	3.12			0.29*	0.29
2.83		3.31		0.48*	0.29
2.83			2.14	0.69*	0.29
	3.12	3.31		0.19*	0.29
	3.12		2.14	0.98*	0.29
		3.31	2.14	1.17*	0.29

**Significant at .05 level of confidence*

The Scheffe's post hoc test result shows that all the three experimental groups contributed to the significant improvement on maximum oxygen consumption. However, high intensity interval training is better than medium and low intensity interval training in improving maximum oxygen consumption.

Discussion

Previous studies have examined the possible interference of interval training on maximum oxygen consumption improvements. The results of the present study also showed significant improvement on maximum oxygen consumption due to low, medium and high intensity interval training. During exercise, VO_2max increases in direct proportion to the rate of work. A person's VO_2max is in part genetically determined; it can be increased through training until the point that the genetically possible maximum is reached. VO_2max is considered the best estimate of a person's cardiorespiratory fitness or aerobic power (Jorgensen et al., 1977).. A six-week training period can result in increases in VO_{2max} in participants undergoing high intensity (Hickson et al., 1981), lower intensity (Cunningham & Cantu, 1990) and endurance training (Carter et al., 1999).

Weltman et al., (1992) arrived at the conclusion that, exercise at lactate threshold, was sufficient for endurance gains within the first 4 months whereas continuing improvement needed higher intensities. To maintain cardio-respiratory endurance, training must be

conducted at least three times per week and training intensity should be 70% VO_2max. These results are conformity with the following findings. Paton and Hopkins (2005) found that 1- and 4-km time trial performance increased could have also been a result of high intensity interval training.

Conclusion

The results of the study produced significant improvement on maximum oxygen consumption due to low, medium and high intensity interval training. However, high intensity interval training is better than moderate and low intensity interval training in improving maximum oxygen consumption.

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