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PHYSICAL EDUCATION

EFFECT OF VARIED INTENSITIES OF AEROBIC TRAINING ON MAXIMAL OXYGEN UPTAKE (VO2MAX) AMONG FOOTBALL PLAYERS

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Abstract

The purpose of the study was to investigate the effect of varied intensity of aerobic training on maximal oxygen uptake Vo2 max of college football players. Forty five players from the Department of Physical Education and Sports Sciences, Annamalai University were selected as subjects. The age, height and weight of the subjects ranged from 17 to 25 years, 162 to 175 centimeters and 56 to 70 kg respectively. The selected subjects were randomly assigned into three equal groups of 15 subjects each. Group I underwent low intensity aerobic training, group II underwent high intensity aerobic training and group III acted as control. Prior to and after the training the subjects were tested on selected criterion variables using standard test and procedures. Analysis of covariance was used to determine the significantly difference existing between pre test and post test on selected criterion variables. The result of the study proved that due to effect of varied intensity of aerobic training the maximal oxygen uptake Vo2 max of football players have significantly increased.

Keywords: Aerobic Training, Varied intensity, Maximal oxygen uptake (Vo2max).

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INTRODUCTION

Aerobic exercise is the best bet for those, who want to quit addictions like alcohol and smoking, because it reduces a person's craving for the habits. It is well established that in chronic lung disease, aerobic exercise capacity is decreased and is limited not only by pulmonary mechanisms, but also by poor nutritional status (Marcotte, et al., 1986). Aerobic training developed the oxygen transport system This specific training improves the ability to continue exercising for a prolonged period and the ability to quickly recover from high-intensity exercises (Rampini *et al.,* 2007). The oxygen system is best trained by endurance workouts, that is, exercises of relatively long duration at sub-maximal level (Janssen, 2001). Usually, the intensity and volume of aerobic exercise are inversely related. Increasing the volume (time) of aerobic training will reduce the intensity to a tolerable level. Aerobic performance is influenced by three factors, maximal aerobic power, anaerobic threshold, and work economy (Hoff *et al.,* 2002). Estimates of the contribution of aerobic energy to performance have varied. Based on the length of the game (90 minutes), at least 90% of energy requirements would have to come from aerobic energy sources *(*Hoff *et al.,* 2002*).* In later research, it was estimated as much as 98% of all energy requirements in any game come from aerobic sources, with only 2% from anaerobic sources (Hoff and Helegerud. 2004). Other reports of game demands 8% of total game time is spent performing high intensity activities such as sprinting, jumping and tackling *(*Bangsbo *et al.,* 1991*)* while other studies report as high as 12% contribution from anaerobic sources. Aerobic exercise includes lower intensity activities performed for longer periods of time. Activities such as walking, running, swimming and cycling are aerobic and require a great deal of oxygen to generate the energy needed for prolonged exercise.

METHODOLOGY

SUBJECTS AND VARIABLES

The purpose of the study was to find out the effect of varied intensities of aerobic exercises on maximal oxygen uptake Vo2 max of college football players. To achieve the purpose of the study, forty five inter collegiate players were selected as subjects. The age, height and weight of the subjects ranged from 17 to 25 years, 162 to 175 centimeters and 56 to 70 kilograms respectively. The selected subjects were medically examined by a qualified physician and certified that they were medically and physically fit enough to undergo the sprint training programme. The selected subjects were randomly assigned into four equal groups of 15 subjects each. Group I underwent high intensity aerobic training, group II underwent low intensity aerobic training and group III acted as control. maximal oxygen uptake Vo2 max by was assessed by Cooper test formula Vo_2 max = $\frac{d_{12} - 504.9}{44.73}$.

TRAINING PROTOCOL

The training programmes were scheduled for one session a day each session lasted between thirty to forty five minutes approximately excluding warming up and warming down. During the training period, the

experimental groups underwent their respective training programme three days per week (alternative days) for sixteen weeks in addition to their curriculum. Group–I on high intensity aerobic training, the intensity of the training increased progressively across the weeks. Intensity starting from 20minutes @ 75% of HRR to 35 minutes @ 85% HRR, followed from first week to sixteen weeks. The group–II concentrated on low intensity aerobic training, intensity starting from 20minutes @ 30% of HRR to 35 minutes @ 45% HRR, followed from first week to sixteen weeks.

EXPERIMENTAL DESIGN AND STATISTICAL TECHNIQUE

The experimental design in this study was random group design involving 45 subjects, who were divided at random in to three group of fifteen each. All the four groups selected from the same population. No effort was made to equate the groups prior to the commencement of the experimental treatment. The pre-test means of the selected dependent variable was used as a covariate. In order to nullify the initial differences the data collected from the three groups prior to and post experimentation on selected dependent variables were statistically analyzed to find out the significant difference if any, by applying the analysis of covariance (ANCOVA). Since four groups were involved, whenever the obtained 'F' ratio for adjusted post test means was found to be significant, the Scheffe's test was applied as post hoc test to determine the paired mean differences. In all the cases level of confidence was fixed at 0.05 for significance.

RESULT OF THE STUDY

TABLE I

ANALYSIS OF COVARIANCE FOR PRE AND POST TEST DATA ON MAXIMAL OXYGEN UPTAKE (VO2 MAX) OF HIGH INTENSITY AEROBIC TRAINING LOW INTENSITY AEROBIC TRAINING GROUPS AND CONTROL GROUP

	Group I	**Group II**	**Group III**	**Source of variance**	**Sum of Squares**	**df**	**Mean squares**	**'F' ratio**
Pretest Mean	47.30	47.00	47.05	Between	1.033	2	0.517	0.32
SD	1.17	0.97	1.10	Within	67.150	42	1.59	
Posttest Mean	57.30	54.85	47.35	Between	1075.033	2	537.517	202.83*
SD	1.30	1.63	1.23	Within	111.300	42	2.65	
Adjusted Posttest Mean	57.14	54.95	47.41	Between	1038.291	2	519.146	348.42*
				Within	61.462	41	1.49	

*** Significant at 0.05 level of confidence. The table value required for significance at 3.37**

The adjusted post test mean values on vo_2^{max} of high intensity aerobic training, low intensity aerobic training and control groups are 57.14, 54.95 and 47.41 respectively. The obtained "F' ratio value of 348.42 for adjusted post test scores is greater than the table value of 3.162 for df 2 and 56 required for significance at .05 level of confidence on vo_2^{max}. The results of the study indicated that there was a significant difference among the adjusted post test means of of high intensity aerobic training, low intensity aerobic training and control groups on vo_2^{max}. To determine the significance difference among the three paired means, the Scheffe's test was applied as post hoc test and the results are presented in table II.

TABLE II
SCHEFFE'S POST HOC TEST FOR THE ADJUSTED POST-TEST PAIRED MEAN DIFFERENCES ON MAXIMAL OXYGEN UPTAKE (VO2 MAX)

ADJUSTED POST TEST MEANS				Confidence Interval
HIATG	LIATG	Control Group	Mean Difference	
57.14	54.95		2.19*	1.50
57.14		47.41	9.73*	1.50
	54.95	47.41	7.54*	1.50

***Significant at 0.05 level of Confidence.**

The table II- shows that the mean difference values between high intensity aerobic training group and low intensity aerobic training group, high intensity aerobic training group and control group, low intensity aerobic training group and control group 2.19, 9.73 and 7.54 respectively on vo_2^{max} which were greater than the required confidence interval value 0.83 at .05 level of confidence. The results of this study showed that high intensity aerobic training group has significantly differed on vo_2^{max} when compared to low intensity aerobic training group and control group. low intensity aerobic training group also significantly differed on vo_2^{max} when compared to control group.

DISCUSSION ON FINDING

The result of present study was that maximal oxygen uptake (Vo_2 max) has increased significantly for high intensity aerobic training and low intensity aerobic training groups as compared to control group. However the result of the present study also reveals increase in maximal oxygen uptake (Vo_2 max) significantly more for high intensity aerobic training group than low intensity aerobic training group. It is inferred that endurance training has produced statistically significant effect on maximal oxygen uptake (Vo_2 max). However, maximal oxygen uptake (Vo_2 max) also improved significantly after strength training protocol. The findings of this research is related to Gormly et al, (2008) who conducted a study to determine the effect of various intensities of aerobic training and concluded that the volume of exercise is the contributing factor for the most effective improvement of Vo_2 max. Helgerud et al, (2007) also conducted a similar study to determine the effect of aerobic endurance training at different intensities and concluded that high intensity endurance interval training is significantly more effective in improving Vo_2 max. Mcmilan et al, (2005) studied the physiological adaptation to a ten week high intensity aerobic interval training and found significant increase in Vo_2 max of soccer players with no negative interference effect on strength, jumping ability and sprinting performance. Less improvement of increased Vo_2 max in endurance and strength training groups toward endurance group can somehow be due to strength training part from concurrent training. Because strength training might cause reduction in mitochondrial density and impede activity of oxidative enzymes which these factors can be negative influence on improving capacity of endurance (Nelson et al., 1990). Also, strength training can cause increase of Vo_2 max through increment of muscle capillary. Corpostagu and Borch (2010) concluded that the fat oxidation is significantly higher during running than cycling at the same relative intensity load. This may be one of the reasons that endurance training influence maximal oxygen uptake (Vo_2 max) and is significantly higher than strength training. Sperlich B et al., have stated high-intensity interval training (HIIT) in junior and adult soccer has been shown to improve oxygen uptake (VO_2^{max}) and enhance soccer performance.

CONCLUSION

1. High intensity aerobic training and low intensity aerobic training groups significant increase in maximal oxygen uptake (Vo_2 max) as compared to control group.
2. High intensity aerobic training produced significant increase in maximal oxygen uptake (Vo_2 max) as compared low intensity aerobic training group.

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