



## HYPOXIC TRAINING AND DETRAINING EFFECTS ON VO<sub>2</sub> MAX OF MEN FOOTBALL PLAYERS

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### ABSTRACT

The objective of the study was to determine the Hypoxic training and detraining effects on Inter-Collegiate Men football Players. To achieve the purpose, forty Inter-Collegiate Men football Players from various colleges were selected at random. Their age ranged between 18 and 25. The selected subjects were divided in two equal groups of 20 each, namely Hypoxic training group (HTG) and control group (CG), experimental group carried out 6 weeks of hypoxic practices for three alternate week followed by 28 days of detraining, whereas control group (CG) maintained their routine activities and no special training was given. Vo<sub>2</sub> max was measured at baseline and immediately after training and also during detraining period (four cessation of 7 days



interval). The data collected from the two groups prior to and post experimentation were statistically analyzed by analysis of covariance (ANCOVA) the data on post experimentation and detraining period (four cessation) of both groups were analyzed by two way (2 × 5) factorial ANOVA with last factor repeated measures, though Hypoxic training improves Vo<sub>2</sub> max (4.65%) but the effect long lasts for 20 days after that its starts detonates to the base level.

**KEYWORDS:** Respiratory Endurance, Vo<sub>2</sub> max, Detraining, Cessations, Factorial ANOVA.

### INTRODUCTION:

Many sports are highly dependent upon the body's ability to uptake and metabolism, oxygen defects is often the singular most important factor in deciding the quality of the performance. Elite players are generally chasing after only very small potential increases" Whereas newcomers to sports are able to significantly increase their VO<sub>2</sub> max with training. Hypoxic means low oxygen workouts that make the oxygen delivery system more efficient, increasing the strength and endurance by up to 40 percent (Gyuton, 1990). In the effect of Hypoxic practices the

organism gradually becomes acclimatized to a lower partial pressure (PO<sub>2</sub>) through the means of increased pulmonary ventilation, hemoglobin in the blood, diffusing capacity of the lungs, Vascularity of the tissues, ability of the cells to utilize oxygen despite the low PO<sub>2</sub>. This generally maximizes the oxygen utilization and develops the endurance parameters "Football is a game which calls for strenuous, continuous thrilling action and therefore, appeals to the world wide. The skills involved in the game are simple, natural and yet are highly stimulating and satisfying to anyone who participates in the game" all the complicated skills need strength, endurance and fatigue less stage to execute it completely at correct circumstances to gain game advantage, oxygen consumed by the players in the field is a dominant factor to

measure the cardio respiratory endurance, maximum oxygen intake differentiates the fitness levels of players improving the consumption of O<sub>2</sub> in the work overall develops the core fitness and respiratory fitness that paves ways for execution, perfection and success.

Detraining refers to the bodily effect experienced when one takes an extended break from regular training. More than two weeks of abstinence from physical training can often cause a reduction in peak fitness level. Activity may need to be postponed for several weeks or months, and the effects of the system may be noticed fairly quickly. Sportsmen's take an extended period of rest to purposefully allow their bodies to detrain. While they may initially lose their current fitness level, the period of rest will allow the muscles time to heal and regenerate. Here the system is trained and detrained with yogic exercise to analyze the levels of muscular endurance.

## METHODOLOGY

To achieve the purpose, 40 intercollegiate men football players age ranged from 19 to 25 years were randomly selected, they were divided into two equal groups 20 each, dependent variable Vo<sub>2</sub> max is measured by three minute step test. The data was collected prior to and immediately after the six weeks training and also during the detraining once in ten days for twenty eight days.

## TRAINING PROGRAM

The experimental group underwent Hypoxic Training, and the control group stayed normal with their routine activity, for three days per week for six weeks. The duration of training period was between thirty and forty five minutes approximately which included warming up and limbering down. For Hypoxic circumstances continuous running with inhaling and exhaling with equal running stride was maintained throughout the course of training. Training progressing was given every two week (i.e. first two weeks two stride inhale and two stride exhale was given while continuous running with 20 minutes and the next two weeks one more stride of inhale and exhale was increased and the same increase for next two weeks). All the subjects involved in this study were carefully monitored throughout the training programme, Vo<sub>2</sub> max was measured in ml/kg/min by three minute step test.

## STATISTICAL TECHNIQUE

Collected data from the two groups prior and post experimentation were statistically analyzed to find out significance difference if any, using analysis of co variance (ANCOVA). The significant f value of adjusted post test explains the effect of the experimental manipulation. The two groups post test and detraining (four cessations) were analyzed by two way (2 × 5) factorial ANOVA with repeated measures on the last factor, when the interaction of the two factor is found significant, simple effect test was used as follow up test. Two groups and five different stages of tests were compared, whenever the F ratio of simple effect test was significant, Scheffe' F test was applied as post hoc test to determine the paired means differences; statistical significance was fixed at .05 level.

## RESULTS:

### Analysis of Co Variance on Vo<sub>2</sub> max of Hypoxic training Group and Control Group

Test	Hypoxic training group	Control group	Source of variance	df	Sum of square	Mean Square	F-ratio
Pre-test	57.73	58.07	Between	1	1.129	1.129	0.095
			Within	38	451.58	11.884	
Post-test	60.42	57.73	Between	1	72.25	725.253	7.721*
			Within	38	355.622	9.358	
Adjusted Post test	60.53	57.63	Between	1	83.775	83.77	17.29*
			Within	37	179.592	4.84	

\* Significant at .05 level for (df 1,38) 4.1 (df 1,37) 4.11

It shows that 6 weeks of hypoxic training improves Vo2 max of the subjects significantly, since the obtained F value of adjusted post test means exceeds the required table value. The data collected from two groups during post test and cessations have been analyzed by two way (2 × 5) factorial ANOVA with repeated measures on the last factor and presented in the following table

### Two Factor ANOVA on Vo2 max of groups at Five different stages of tests

Source of Variance	Sum of Squares	DF	Mean squares	F-ratio
Factor A (Groups)	69.14	1	69.14	3.09
Groups Error	848.92	38	22.34	
Factor B (Tests)	8.219	4	2.032	0.289
Factor AB Interaction (Groups & tests)	73.38	4	18.346	2.60*
Error	1068.89	152	7.032	

\* Significant at .05 level for (df 1,38) 4.1 (df 4,152) 2.43

It shows that significant difference exists among groups and tests (interaction) on the variable. Since the interaction effect is significant simple effect test was used as follow up test and they are presented in the following table.

### Simple Effect Scores of Groups and Five Different stages of tests

Source of Variance	Sum of Squares	DF	Mean Squares	F - ratio
<b>Groups at Post test</b>	72.53	1	72.53	10.27*
<b>Groups at First Cessation</b>	55.31	1	55.31	7.86*
<b>Groups at Second Cessation</b>	13.83	1	13.83	4.96*
<b>Groups at Third Cessation</b>	14.32	1	14.32	4.12*
<b>Groups at Fourth Cessation</b>	1.129	1	1.129	0.18
<b>Tests and Experimental group</b>	46.965	4	11.74	2.66*
<b>Tests and Control group</b>	34.54	4	8.63	1.22
<b>Error</b>	1068.89	152	7.032	

\* Significant at .05 level for (df 1,152) 3.9 (df 4,152) 2.43

It was found that significant difference exists between groups during post test, I, II, III, Cessations periods. It was found that significant difference exists among tests in experimental group on Vo2 max, since the obtained values was higher than the required value. However no significant difference exists between tests in control group. Since the value was significant Scheffe' F test was applied and presented in table.

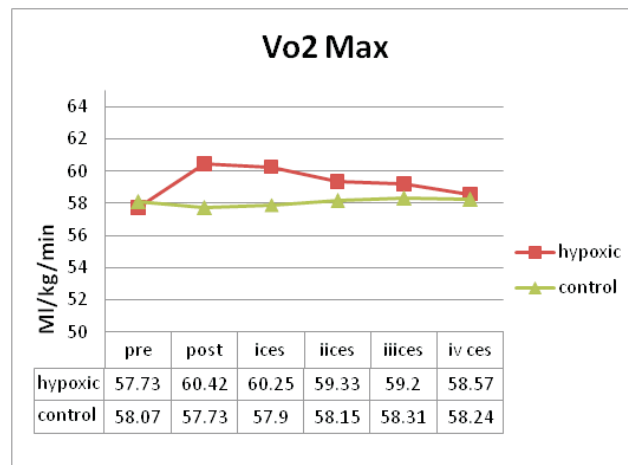
### Scheffe'F test for the differences among paired mean differences of Hypoxic training Group with different tests on Vo2 max

	Post test	I cessation	II cessation	III cessation	IV cessation
Post test	–	0.743	3.45	7.65	12.64*
I cessation	–	–	1.12	4.49	10.52*
II cessation	–	–	–	1.12	6.62
III cessation	–	–	–	–	0.78

The F value required to be significant at .05 level is  $(k-1)(F_{.05})$  9.72

Scheffe F post hoc test has the greatest power and is the most conservation with respect to Type 1 error: this

method leads to the smallest number of significance differences. The difference between two means would be significant if it exceed Scheffe F. In order to be significant, 'F' must be equal to  $(k - 1) (F .05 \text{ or } F .01)$ . Thus, the necessary 'F' ratios for the difference between paired adjusted mean  $(k-1)$  would be computed and compared for significance.



It was found that no significant decrease in Vo2 max during post and first cessation, post and second cessation, post and third cessation, first and second cessation, first and third cessation, second and third, second and fourth and third and fourth cessations of hypoxic training group. However significant decrease in Vo2 max was found during post and fourth cessation, first and fourth cessations periods.

## CONCLUSION

From the result it was concluded that Vo2 max can be improved by hypoxic training for about Six weeks, further it was concluded that Vo2 max level can be maintained for twenty days during the detraining period, there after these effect starts declining towards the base line. Hence it is suggested that sportsmen's who were in much need of oxygen consumption by Hypoxic training should not undergo detraining for not more than twenty days in a row. Thus the Vo2 max effects long lasts not more than twenty days, this can be maintained for prolong period by undergoing limited amount of the same practices during the detraining periods also.

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