



## EFFICACY OF INTENSIVE AND EXTENSIVE INTERVAL TRAINING ON SELECTED BIOMOTOR ABILITIES AMONG SCHOOLBOYS

M. ELAMARAN<sup>a,\*</sup>

<sup>a</sup>Department of Physical Education and Sports Sciences, Annamalai University,  
Chidambaram- 608002, Tamilnadu, India

\*Corresponding Author Ph: +(91) - 9994467052; Email: [maran\\_1974@yahoo.co.in](mailto:maran_1974@yahoo.co.in)

DOI: 10.26524/14114

### ABSTRACT

The present study was to compare the intensive and extensive interval training effects on selected biomotor abilities among schoolboys. For this purpose, forty-five male students of Okkoor Vellayan Chettiyar Higher Secondary School, Manamadurai, Sivagangai District, in the age group of 16 to 18 years were randomly selected as subjects. The selected subjects were assigned to one of the three groups namely; intensive interval training, extensive interval training and control group of fifteen subjects each. The selected dependent variables such as cardiorespiratory endurance and speed were appraised using methods and instruments of scientific standards. The experimental groups underwent their respective training programme for three days a week for eight weeks. To statistically analyse the changes on criterion variables, 'ANCOVA' and Scheffé S test were used. The analysis of data revealed significant improvement on selected criterion variables as a result of experimental treatment. Where, intensive interval training amplified speed significantly, while extensive interval training enhanced cardiorespiratory endurance better. These results suggest that interval training of varied intensity may be adopted according to the need of the player.

**Keywords:** Interval training, cardiorespiratory endurance, speed.

### Introduction

One of the greatest accomplishments to be celebrated is the continuous pursuit of fitness. The improvement and maintenance of physical fitness or condition is perhaps the most important aim of sports training. Each person requires a different type and level of physical condition and as a result different type of fitness training or conditioning is required for different people.

The basic physiological consideration that needs to be addressed in designing any conditioning program is to identify the major source of energy systems utilized to perform the given activity. Then, is the developing of progressive overload of energy systems.

Regardless of the mode of training, the essential elements of conditioning that will determine the effectiveness of the program involve the application of intensity, duration and frequency.

The challenge facing the fitness professional is how best to manipulate progressive overload, and intermix intensity, duration, and frequency with a variety of modes of activity, to help the players achieve their goals. Fortunately, a number of different training programs are available at disposal for imparting, of which interval training is the one that can be implemented with ease. Yet, to understand the nature of influence of interval training of different



intensities on selected fitness variables of schoolboys.

Endurance training can be divided into interval, long-duration, or continuous training [1]. Basic endurance training performed at a low intensity, develops the fat utilization capacity of muscles and increases their capillary blood vessel density. This latter effect, together with the increase in cardiac stroke volume, helps to improve the oxidative capacity of muscles. The duration of basic endurance training varies from one hour to several hours, and the intensity of long duration training should be 60-80% of  $VO_2\text{max}$  [2]. Whereas, the high intensity endurance training is designed to develop respiratory and circulatory functions, the oxidative and glycolytic capacities of the muscles, and the elimination of lactic acid from the muscles. This can vary in intensity between the aerobic and anaerobic thresholds, and the duration of an individual exercise bout can depend on its nature and intensity. A long exercise bout

### Methods and Procedures

Forty-five male students of Okkoor Vellayan Chettiyar Higher Secondary School, Manamadurai, Sivagangai District, in the age group of 16 to 18 years were randomly selected as subjects. The selected subjects were assigned to one of the three groups namely; intensive interval training, extensive interval training and control group of fifteen subjects each. The selected dependent variables such as cardiorespiratory endurance and speed were appraised using methods and instruments of scientific standards. The experimental groups underwent their respective training

performed at constant speed can last from 30 to 60 minutes. Interval-type exercise bouts consists of a number of shorter bursts performed at various levels of heart rate, and the duration varies from few tenths of a second to a few minutes.

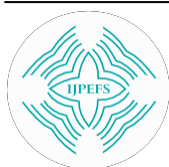
This High volume endurance training has traditionally been used by coaches to develop fitness levels in players. This form of training is known to induce both central and peripheral physiological adaptations that result in an increased maximum oxygen uptake [3-6].  $VO_2\text{max}$  is generally accepted as a measurement of cardiorespiratory endurance. Cardiorespiratory endurance is an important characteristic of physical fitness due to its high correlation with health and health risks [7,8].

Hence, the purpose of the present study was to compare the intensive and extensive interval training effects on selected biomotor abilities among schoolboys.

programme for three days a week for eight weeks.

### Exercise Training Protocol

The exercise training program of both the experimental groups [intensive interval training (IIT; 80 - 90%  $HR_{\text{max}}$ ), and extensive interval training (EIT; 60 - 70% of their maximum heart rate- $HR_{\text{max}}$ )] consisted of sprinting for distance in time and then jogging or walking for a short period that allows incomplete recovery of the heart rate. The subjects confined to both the experimental groups trained thrice a week for eight weeks, while the control group was not exposed to any specific training programme. During every second week of a particular



training intensity, one repetition is performed additionally. Further, the prescription of exercise allows two weeks of stabilization to a training intensity, and thereafter the time

limit to execute the exercise was reduced so as to increase the intensity of exercise. The training schedule prescribed to both the experimental groups was as given in Table-I

Table – I: Training Schedule

Experimental Groups	Training Distance		I & II week	III & IV week	V & VI week	VII & VIII week	Repetition	Recovery Duration
	Day	in metres	in seconds	in seconds	in seconds	in seconds	in numbers	in seconds
Intensive Interval Training	Mon	100	15	14.65	14.3	14	7 to 8	120
	Wed	200	45	44	43	42	6 to 7	180
	Fri	400	100	98	96	94	4 to 5	240
Extensive Interval Training	Mon	100	18	17.65	17.3	17	11 to 12	60
	Wed	200	50	49	48	47	9 to 10	90
	Fri	400	110	108	106	104	6 to 7	120

### Experimental Design and Statistical Techniques

Random group design involving forty-five subjects was used for the purpose of the study. To statistically analyse the changes on criterion variables, 'ANCOVA' and Scheffé S test were used. The level of significance was accepted at  $P < 0.05$ .

### Results and Discussion

The analysis of covariance on cardiorespiratory endurance and speed of intensive interval training, extensive interval training and control groups were statistically examined and presented in Table – II.

Table – II: Analysis of covariance on criterion variables of intensive and extensive interval training and control groups

	Intensive Interval Training Group	Extensive Interval Training Group	Control Group	Source of Variance	Sum of Square	df	Mean Square	F Ratio
Adjusted Post Test Mean								
Cardio respiratory Endurance	2237.35	2464.23	2085.09	Between	952299	2	476149.4	73.351*
				Within	266147	41	6491.4	



Speed	7.193	7.507	7.853	Between	3.252	2	1.626	147.818*
				Within	0.440	41	0.011	

\* Significant of 0.05 level of confidence

The required table value for significance at 0.05 level of confidence with degrees of freedom 2 and 41 is 3.226 and degree of freedom 2 and 42 is 3.222.

The obtained 'F' ratio of 73.351 and 147.818 for adjusted posttest means on cardiorespiratory endurance and speed respectively are greater than the table value of 3.226 for df 2 and 41 required for significance at .05 level. The result indicates that there is a significant difference among

adjusted post-test means of intensive interval training, extensive interval training, and control groups on cardiorespiratory endurance and speed.

Since, the 'F' ratios are found to be significant, the Scheffé S post hoc test has been applied to find out the significant paired mean differences, and it is presented in Table III.

Table – III: Scheffé S test for the differences between adjusted posttest paired means

Adjusted Posttest Mean			Mean Differences	Confidence Interval
Intensive Interval Training Group	Extensive Interval Training Group	Control Group		
Cardiorespiratory Endurance				
2237.35	2464.23		-226.879*	74.73
2237.35		2085.09	152.261*	74.73
	2464.23	2085.09	379.140*	74.73
Speed				
7.193	7.507		0.314*	0.097
7.193		7.853	0.660*	0.097
	7.507	7.853	0.346*	0.097

\*Significant at .05 level.

Table III reveals that there is a significant influence of both intensive and extensive interval training on abdominal muscular strength endurance, but they didn't differ significant in the level of its effectiveness at .05 level of confidence.

Table III also reveals that both intensive interval training and extensive interval training has a significant level of impact on both cardiorespiratory endurance and speed, but they differ significantly at .05 level of confidence, in their level of efficiency.

Numerous field and laboratory based investigations have shown interval training to be an efficient training approach for developing aerobic power. An increase in  $\text{VO}_2\text{max}$  in response to interval training have been reported by Sperlich *et al.*, (2011) [9], Helgerud *et al.*, (2001) [10] and Burgomaster *et al.*, (2008) [11]. Furthermore, Sperlich *et al.*, (2011) [9] also found a significant improvement in sprint performance in adolescent soccer players in response to both high intensity and high volume training.

### References

1. W. D. McArdle, F. I. Katch, V. L. Katch (2001) Exercise Physiology. Energy, Nutrition, and Human Performance, Baltimore, USA: Lippincott Williams & Wilkins.
2. H. Rusko, P. Luhtanen, P. Rahkila, J. Viitasalo, S. Rehunen, M. Harkonen, Muscle Metabolism, Blood Lactate and Oxygen Uptake in Steady State Exercise at Aerobic and Anaerobic Thresholds, *European Journal of Applied Physiology*, 55 (1986) 181-186.
3. C. M. Mier, M. J. Turner, A. A. Ehsani, R. J. Spina, Cardiovascular adaptations to 10 days of cycle exercise, *Journal of Applied Physiology*, 83(1997) 1900-1906.
4. J. A. Davis, M. H. Frank, B. J. Whipp, K. Wasserman, Anaerobic endurance threshold alterations caused by training in middle-aged men, *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, 46 (1979) 1039-1046.
5. P. Andersen, J. Henriksson, Capillary supply of the quadriceps femoris muscle of man adaptive response to exercise, *Journal of Physiology*, 270 (1977) 677-690.
6. P. D. Gollnick, R. B. Armstrong, B. Saltin, C. W. Saubert, W. L. Sembrowich, R. E. Shepherd, Effect of training composition on enzyme activity and fiber of human skeletal muscle, *Journal of Applied Physiology*, 34 (1973) 107-111.
7. S. N. Blair, J. B. Kampert, H. W. Kohl, C. E. Barlow, C. A. Macera, R. S. Jr. Paffenbarger, L. W. Gibbons, Influences of cardiorespiratory fitness and other precursors on cardiovascular disease and all-cause mortality in men and women, *Journal of the American Medical Association*, 276 (1996) 205-210.
8. R. P. Wilder, J. A. Greene, K. L. Winters, W. B. Long, K. Gubler, R. F. Edlich, Physical fitness assessment: an update, *Journal of Long-Term Effects of Medical Implants*, 16 (2006) 193-204.
9. B. Sperlich, M. D. Marées, K. Koehler, J. Linville, H. C. Holmberg, J. Mester, Effects of 5 weeks high-intensity interval training vs. volume training in 14-year-old soccer players, *Journal of Strength and Conditioning Research*, 25 (2011) 1271-1278.
10. J. Helgerud, L. C. Engen, U. Wisloff, J. Hoff, Aerobic endurance training improves soccer performance, *Medicine and Science in Sports and Exercise*, 33 (2001) 1925-1931.
11. K. A. Burgomaster, K. R. Howarth, S. M. Phillips, M. Rakobowchuk, J. M. MacDonald, S. L. McGee, M. J. Gibala, Similar metabolic adaptations during exercise after low volume sprint interval and traditional endurance training in humans, *Journal of Physiology*, 586 (2008) 151-160.

### Conclusions

The analysis of data revealed significant improvement on selected criterion variables as a result of experimental treatment. Where, intensive interval training amplified speed significantly, while extensive interval training enhanced cardiorespiratory endurance better. These results suggest that interval training of varied intensity may be adopted according to the need of the player.