



## Effect of Yogic Practices, Aerobic Exercise and Interval Training on Selected Lipid profiles among School Boys

N. Chandrakumar<sup>1</sup> & Dr. C. Ramesh<sup>2</sup>

<sup>1</sup>Ph.D., Research Scholar, Department of Physical Education, Madurai Kamaraj University, Madurai Tamilnadu, India.

<sup>2</sup>Assistant Professor, Department of Physical Education, Madurai Kamaraj University, Madurai Tamilnadu, India.

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### Abstract

The purpose of the study was to determine the best training packages among the yogic practices, aerobic exercise and interval training on selected health related physical fitness namely cardio respiratory endurance and flexibility among school boys. To achieve the purpose of the present study, sixty school boys from Dindigul district, Tamilnadu were selected as subjects at random and their ages ranged from 13 to 17 years. The subjects were divided into four equal groups of fifteen school boys each. The study was formulated as a true random group design, consisting of a pre-test and post-test. The subjects (N=60) were randomly assigned to four equal groups of fifteen school boys each. The groups were assigned as yogic practices, aerobic exercises, interval training and control group in an equivalent manner. The group I underwent yogic practices, group II underwent aerobic exercises, group III underwent interval training and group IV acted as a control group. The three experimental groups were participated the training for a period of twelve weeks to find out the outcome of the training packages and the control group did not participated in any training programme. The variable to be used in the present study was collected from all subjects before they have to treat with the respective treatments. It was assumed as pre-test. After completion of treatment they were tested again as it was in the pre-test on all variables used in the present study. This test was assumed as post-test. The following statistical techniques were adopted to treat the collected data in connection with established hypothesis and objectives of this study. Analysis of covariance (ANCOVA) was applied because the subjects were selected random, but the groups were not equated in relation to the factors to be examined. Hence the difference between means of the four groups in the pre-test had to be taken into account during the analysis of the post-test differences between the means. This was achieved by the application of the analysis of covariance, where the final means were adjusted for differences in the initial means, and the adjusted means were tested for significance. Whenever the adjusted post-test means were found significant, the scheffe's post-hoc test was administer to find out the paired means difference. To test the obtained results on variables, level of significance 0.05 was chosen and considered as sufficient for the study. The significant mean difference does not exist among the experimental groups in the pre test on cardio respiratory endurance and flexibility. In testing post test mean difference among the experimental groups statistically significant on variables of cardio respiratory endurance and flexibility. In testing the post adjusted mean among the experimental groups also predicts the above result. In comparing the effect the YPG showed better performance on flexibility. In comparing the effect the AEG and ITG produced similar effect on both the variables.

**Keywords:** Yogic Practices, Aerobic, Interval Training, School.

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### Introduction

The word "Yoga" is derived from the Sanskrit root "Yuj" which means union, joining, harnessing, contact, or connection. It is union between the individual self and the universal self. It is the fusion of a healthy body with a disciplined mind for the purpose of spiritual development. Yoga is also blissful contact with the supreme element, higher than the highest of the known elements. It is the harnessing of one's inherent inner power, as well as the wider natural forces from which

one has emerged. Yoga is an inseparable part of the Indian life and culture. It has come down to us from antiquity with an unbroken tradition. Integration encompasses putting together and controlling the same judiciously. This is consistent with the definition of Yoga in "Bhagavad Gita" which says, "Smatvameva Yoga Uchyate" that is equanimity is called Yoga. It means that yoga remains equipoised in success and failure, gain and loss, victory and defect etc. The term 'Samatva' may also be translated as equilibrium, which leads to harmonious development of the physical, mental and spiritual aspects of human personality. Equanimity and equilibrium are thus the essential traits of Yoga. They help in the skilful performance of an action (Iyengar, 1986).

### Correspondence

N.Chandrakumar

E-mail: m.n.chandruphydir@gmail.com, Ph. +9197502 11296

Aerobic capacity describes the functional status of the cardio respiratory system (the heart, lungs and blood vessels). Aerobic capacity is defined as the maximum volume of oxygen that can be consumed by one's muscles during exercise. It is a function both of one's cardio respiratory performance and of the ability of the muscles to extract the oxygen and fuel delivered to them. To measure maximal aerobic capacity, an exercise physiologist or physician will perform a VO<sub>2</sub> max test, in which a subject will undergo progressively more strenuous exercise on a treadmill, from an easy walk through to exhaustion. The individual is typically hooked up to a respirometer to measure oxygen, and the speed is increased incrementally over a fixed duration of time. The higher a cardiorespiratory endurance level, the more oxygen transported to exercising muscles, the longer exercise can be maintained without exhaustion and accordingly the faster they are able to run. Higher the aerobic capacity, higher the level of aerobic fitness (Stoll, et al. 1989). The concept of interval training has existed for a number of years in one form or another. With interval training, short to moderate periods of work are alternated with short to moderate periods of rest, or reduced activity. The concept has a firm foundation in physiological principles. Researchers have demonstrated that athletes can perform a considerably greater volume of work by breaking the total work into short, intense bouts with rest, or reduced activity, intervals interspersed between consecutive work bouts. The intervals of work and rest are usually equal and can vary from several seconds to five minutes or more.

### Methodology

The purpose of the study was to determine the best training packages among the yogic practices, aerobic exercise and interval training on selected lipid profiles namely high density lipoprotein, low density lipoprotein and total cholesterol among school boys. To achieve the purpose of the present study, sixty school boys from Dindigul district, Tamilnadu were selected as

subjects at random and their ages ranged from 13 to 17 years. The subjects were divided into four equal groups of fifteen school boys each. The study was formulated as a true random group design, consisting of a pre-test and post-test. The subjects (N=60) were randomly assigned to four equal groups of fifteen school boys each. The groups were assigned as yogic practices, aerobic exercises, interval training and control group in an equivalent manner. The group I underwent yogic practices, group II underwent aerobic exercises, group III underwent interval training and group IV acted as a control group. The three experimental groups were participated the training for a period of twelve weeks to find out the outcome of the training packages and the control group did not participated in any training programme. The variable to be used in the present study was collected from all subjects before they have to treat with the respective treatments. It was assumed as pre-test. After completion of treatment they were tested again as it was in the pre-test on all variables used in the present study. This test was assumed as post-test. The following statistical techniques were adopted to treat the collected data in connection with established hypothesis and objectives of this study. Analysis of covariance (ANCOVA) was applied because the subjects were selected random, but the groups were not equated in relation to the factors to be examined. Hence the difference between means of the four groups in the pre-test had to be taken into account during the analysis of the post-test differences between the means. This was achieved by the application of the analysis of covariance, where the final means were adjusted for differences in the initial means, and the adjusted means were tested for significance. Whenever the adjusted post-test means were found significant, the scheffe's post-hoc test was administer to find out the paired means difference. To test the obtained results on variables, level of significance 0.05 was chosen and considered as sufficient for the study.

### Results

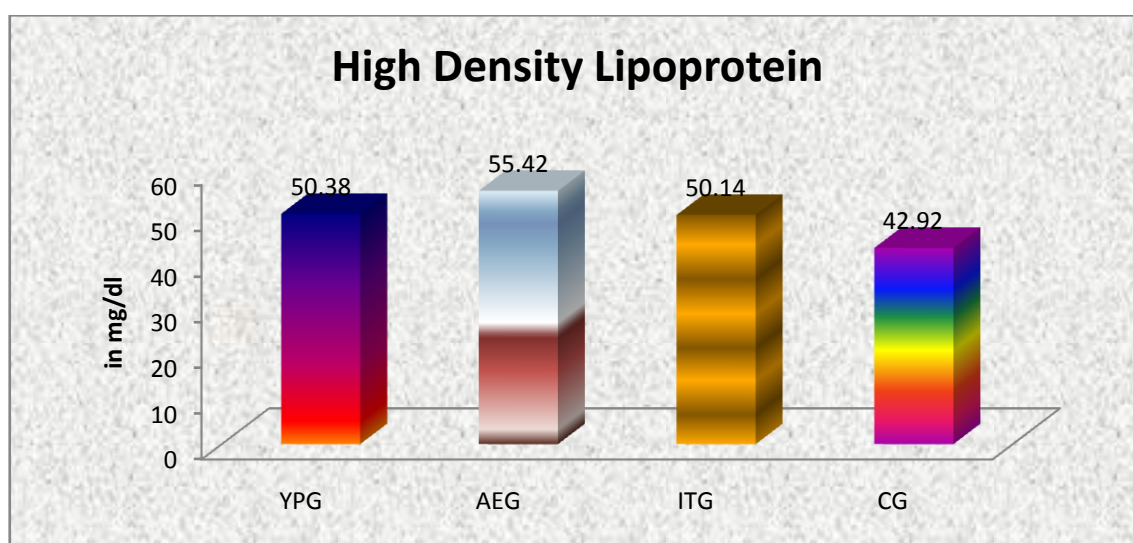
**Table I.** Computation of Analysis of Covariance of Yogic Practices, Aerobic Exercises, Interval Training and Control Groups on High Density Lipoprotein (YPG, AEG, ITG & CG)

	YPG	AEG	ITG	CG	Source of Variance	Sum of Squares	df	Means Squares	F-ratio
<b>Pre-Test Means</b>	42.79	42.08	42.72	42.64	<b>BG</b>	4.65	3	1.5	0.79
					<b>WG</b>	109.66	56	1.95	
<b>Post-Test Means</b>	50.37	55.44	50.14	42.92	<b>BG</b>	1194.56	3	398.19	113.56*
					<b>WG</b>	196.34	56	3.50	
<b>Adjusted Post-Test Means</b>	50.38	55.42	50.14	42.92	<b>BG</b>	1171.55	3	390.52	109.58*
					<b>WG</b>	196.00	55	3.56	

Table I reveals that the indicated that the obtained 'F'-ratio for the pre-test means among the groups on high density lipoprotein were 42.79 for experimental group – I, 42.08 for experimental group – II, 42.72 for experimental group - III and 42.64 for control group. The obtained 'F'-ratio 0.79 was lesser than the table 'F'-ratio 2.76. Hence the pre-test mean 'F'-ratio was insignificant at 0.05 level of confidence for the degree of freedom 3 and 56. The post-test means were 50.37 for experimental group – I, 55.44 for experimental group – II, 50.14 for experimental group - III and 42.92 for control group. The obtained 'F'-ratio 113.56 was higher than the table 'F'-ratio 2.76. Hence

the post-test mean 'F'-ratio was significant at 0.05 level of confidence for the degree of freedom 3 and 56. The adjusted post-test means were 50.38 for experimental group – I, 55.42 for experimental group – II, 50.14 for experimental group - III and 42.92 for control group. The obtained 'F'-ratio 109.58 was higher than the table 'F'-ratio 2.77. Hence the adjusted post-test mean 'F'-ratio was significant at 0.05 level of confidence for the degree of freedom 3 and 55. It was concluded that there was a significant mean difference among yogic practices group, aerobic exercises group, interval training group and control group, in increasing high density lipoprotein of the school boys.

**Figure I.** Adjusted Post Test Mean Values of the Yogic Practices, Aerobic Exercises, Interval Training and Control Groups on High Density Lipoprotein (YPG, AEG, ITG & CG)



**Table II.** The Scheffe’s Test for the Differences between the Adjusted Post Test Means on High Density Lipoprotein

Adjusted Post-Test Means				Mean Difference	Confidence Interval
YPG	AEG	ITG	CG		
50.38	55.42	---	---	5.04*	1.98
50.38	---	50.14	---	0.24	
50.38	---	---	42.92	7.46*	
---	55.42	50.14	---	5.28*	
---	55.42	---	42.92	12.50*	
---	---	50.14	42.92	7.22*	

\* Significant at 0.05 level of confidence

Table II shows the post hoc analysis obtained on adjusted post test means. The mean difference required for the confidential interval to be significant was 1.98. It was observed that the aerobic exercises group significantly increased high density lipoprotein better than the yogic practices group, interval training group and control group. The yogic practices group

significantly increased high density lipoprotein better than the control group. The interval training group significantly increased high density lipoprotein better than the control group. Hence the yogic practices group and interval training group produced similar effect on high density lipoprotein.

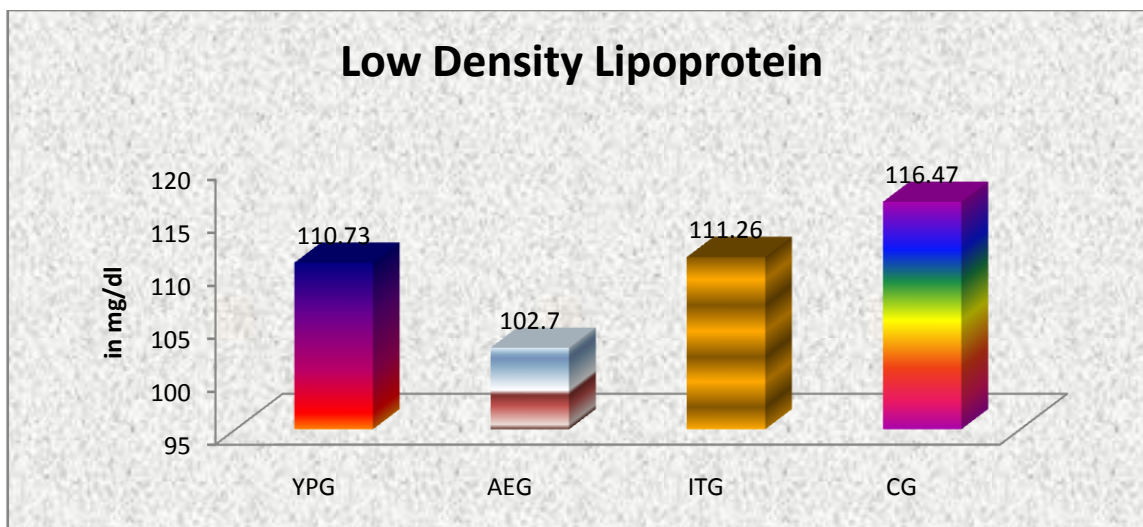
**Table III.** Computation of Analysis of Covariance of Yogic Practices, Aerobic Exercises, Interval Training and Control Groups on Low density Lipoprotein (YPG, AEG, ITG & CG)

	YPG	AEG	ITG	CG	Source of Variance	Sum of Squares	df	Means Squares	F-ratio
<b>Pre-Test Means</b>	117.04	116.76	116.42	116.71	<b>BG</b>	2.96	3	0.98	0.33
					<b>WG</b>	168.09	56	3.00	
<b>Post-Test Means</b>	110.78	102.70	111.20	116.47	<b>BG</b>	1452.41	3	484.13	136.55*
					<b>WG</b>	198.54	56	3.54	
<b>Adjusted Post-Test Means</b>	110.73	102.70	111.26	116.47	<b>BG</b>	1454.65	3	484.88	137.58*
					<b>WG</b>	193.84	55	3.52	

Table III reveals that the indicated that the obtained ‘F’-ratio for the pre-test means among the groups on low density lipoprotein were 117.04 for experimental group – I, 116.76 for experimental group - II, 116.42 for experimental group - III and 116.71 for control group. The obtained ‘F’-ratio 0.33 was lesser than the table ‘F’-ratio 2.76. Hence the pre-test mean ‘F’-ratio was insignificant at 0.05 level of confidence for the degree of freedom 3 and 56. The post-test means were 110.78 for experimental group – I, 102.70 for experimental group – II, 111.20 for experimental group - III and 116.47 for control group. The obtained ‘F’-ratio 136.55 was higher than the table ‘F’-ratio 2.76. Hence

the post-test mean ‘F’-ratio was significant at 0.05 level of confidence for the degree of freedom 3 and 56. The adjusted post-test means were 110.73 for experimental group – I, 102.70 for experimental group – II, 111.26 for experimental group - III and 116.47 for control group. The obtained ‘F’-ratio 137.58 was higher than the table ‘F’-ratio 2.77. Hence the adjusted post-test mean ‘F’-ratio was significant at 0.05 level of confidence for the degree of freedom 3 and 55. It was concluded that there was a significant mean difference among yogic practices group, aerobic exercises group, interval training group and control group, in reducing low density lipoprotein of the school boys.

**Figure II.** Adjusted Post Test Mean Values of the Yogic practices, Aerobic Exercises, Interval Training and Control Groups on Low Density Lipoprotein (YPG, AEG, ITG & CG)



**Table IV.** The Scheffe's Test for the Differences between the Adjusted Post Test Means on Low Density Lipoprotein

Adjusted Post-Test Means				Mean Difference	Confidence Interval
YPG	AEG	ITG	CG		
110.73	102.70	---	---	8.03*	1.97
110.73	---	111.26	---	0.53	
110.73	---	---	116.47	5.74*	
---	102.70	111.26	---	8.56*	
---	102.70	---	116.47	13.77*	
---	---	111.26	116.47	5.21*	
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**\* Significant at 0.05 level of confidence**

Table IV shows the post hoc analysis obtained on adjusted post test means. The mean difference required for the confidential interval to be significant was 1.97. It was observed that the aerobic exercises group significantly reduced low density lipoprotein better than the yogic practices group, interval training group and control group. The yogic practices group

significantly reduced low density lipoprotein better than the control group. The interval training group significantly reduced low density lipoprotein better than the control group. Hence the yogic practices group and interval training group produced similar effect on low density lipoprotein.

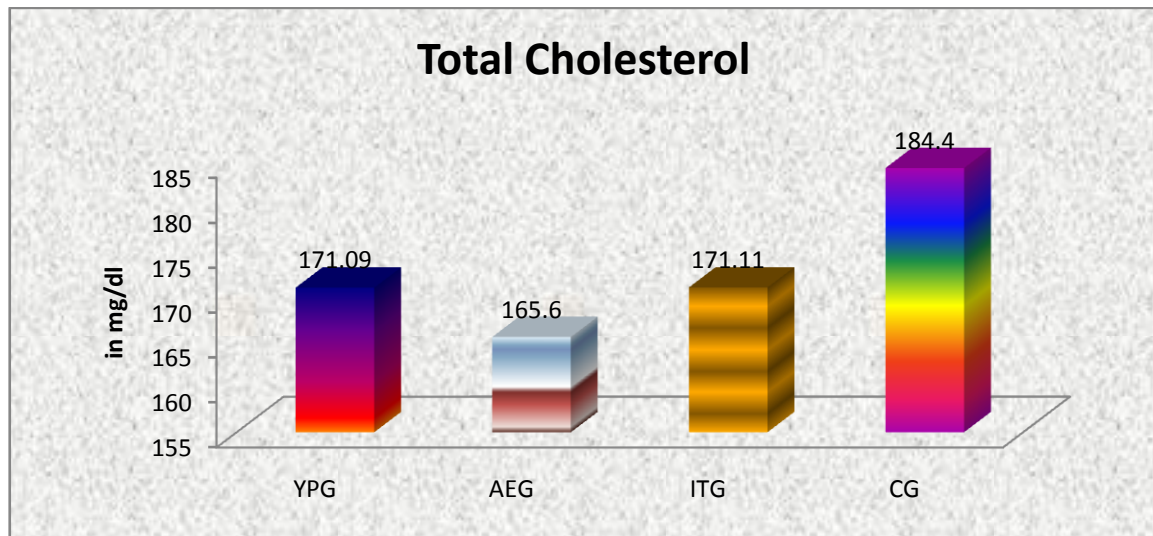
**Table V.** Computation of Analysis of Covariance of Yogic Practices, Aerobic Exercises, Interval Training and Control Groups on Total Cholesterol (YPG, AEG, ITG & CG)

	YPG	AEG	ITG	CG	Source of Variance	Sum of Squares	df	Means Squares	F-ratio
Pre-Test Means	185.32	185.82	186.36	184.74	BG	21.45	3	7.15	1.11
					WG	358.48	56	6.40	
Post-Test Means	171.04	165.64	171.26	184.26	BG	2815.36	3	938.45	96.26*
					WG	545.92	56	9.74	
Adjusted Post-Test Means	171.09	165.60	171.11	184.40	BG	2790.66	3	930.22	95.69*
					WG	534.61	55	9.72	

Table V reveals that the indicated that the obtained 'F'-ratio for the pre-test means among the groups on total cholesterol were 185.32 for experimental group – I, 185.82 for experimental group - II, 186.36 for experimental group - III and 184.74 for control group. The obtained 'F'-ratio 1.11 was lesser than the table 'F'-ratio 2.76. Hence the pre-test mean 'F'-ratio was insignificant at 0.05 level of confidence for the degree of freedom 3 and 56. The post-test means were 171.04 for experimental group – I, 165.64 for experimental group – II, 171.26 for experimental group - III and 184.26 for control group. The obtained 'F'-ratio 96.26 was higher than the table 'F'-ratio 2.76. Hence the post-test mean

'F'-ratio was significant at 0.05 level of confidence for the degree of freedom 3 and 56. The adjusted post-test means were 171.09 for experimental group – I, 165.60 for experimental group – II, 171.11 for experimental group - III and 184.40 for control group. The obtained 'F'-ratio 95.69 was higher than the table 'F'-ratio 2.77. Hence the adjusted post-test mean 'F'-ratio was significant at 0.05 level of confidence for the degree of freedom 3 and 55. It was concluded that there was a significant mean difference among yogic practices group, aerobic exercises group, interval training group and control group, in reducing total cholesterol of the school boys.

**Figure III.** Adjusted Post Test Mean Values of the Yogic Practices, Aerobic Exercises, Interval Training and Control Groups on Total Cholesterol (YPG, AEG, ITG & CG)



**Table VI.** The Scheffe’s Test for the Differences between the Adjusted Post Test Means on Total Cholesterol

Adjusted Post-Test Means				Mean Difference	Confidence Interval
YPG	AEG	ITG	CG		
171.09	165.60	---	---	5.49*	3.27
171.09	---	171.11	---	0.02	
171.09	---	---	184.40	13.31*	
---	165.60	171.11	---	5.51*	
---	165.60	---	184.40	18.80*	
---	---	171.11	184.40	13.29*	

\* Significant at 0.05 level of confidence

Table VI shows the post hoc analysis obtained on adjusted post test means. The mean difference required for the confidential interval to be significant was 3.27. It was observed that the aerobic exercises group significantly decreased total cholesterol better than the yogic practices group, interval training group and control group. The yogic practices group significantly decreased total cholesterol better than the control group. The interval training group significantly decreased total cholesterol better than the control group. Hence the yogic practices group and interval training group produced similar effect on total cholesterol.

**Conclusion**

1. The significant mean difference does not exist among the experimental groups in the pre test on high density lipoprotein, low density lipoprotein and total cholesterol.
2. In testing post test mean difference among the experimental groups statistically significant on variables of high density lipoprotein, low density lipoprotein and total cholesterol. In testing the post adjusted mean among the experimental groups also predicts the above result.

3. In comparing the effect the AEG showed better performance on high density lipoprotein, low density lipoprotein and total cholesterol.
4. In comparing the effect the YPG and ITG produced similar effect on both the variables.

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