



Effects of Aerobic and Anaerobic Training Followed by Cessation on Total Cholesterol of Anna University Men Players

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Abstract

The purpose of the study was to find out the effects of aerobic and anaerobic training followed by cessation on total cholesterol of Anna university men players. To achieve this purpose of the study, forty five men students who were studying in various affiliated engineering colleges of Anna university zone VII and who were participated in intercollegiate tournaments during the year 2012-13 were randomly selected as subjects. They were divided into three equal groups of each fifteen subjects. The group I underwent aerobic training, group II underwent anaerobic training group and group III acted as control group for three days per week for twelve weeks. Total cholesterol was assessed by lab test. All the subjects of three groups were tested on total cholesterol at prior to and immediately after the training programme as pre and post test. Analysis of covariance (ANCOVA) was used to find out the significant difference if any, among the groups on each selected criterion variables separately. In all the cases 0.05 level of confidence was fixed to test the significance, which was considered as appropriate. The results of the study indicated that the experimental groups namely aerobic training and anaerobic training group had significantly influenced on the performance of the total cholesterol. The control group had no significant differences on total cholesterol.

Keywords: Aerobic, Anaerobic, Anna University, Cessation, Total Cholesterol.

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Introduction

Aerobic exercise is any physical activity that requires the heart rate to reach at least 60% of the maximal heart rate for an extended period of time. Also it is an activity that can be sustained for an extended period of time without developing an oxygen deficit. The main objective of an aerobic exercise program is to increase the maximum amount of oxygen that the body can process within a given time. This is called "Aerobic capacity". It is dependent upon an ability to (1) rapidly breathe a large amount of air, (2) forcefully deliver large volumes of blood and (3) effectively deliver oxygen to all parts of the body. In short, it depends upon efficient lungs, a powerful heart, and a good vascular system. Because it reflects the conditions of these vital organs, the aerobics capacity is the best index of overall physical fitness. Regular aerobic exercises will improve cardiovascular and cardio respiratory function (heart and lungs), an increased maximal oxygen consumption (VO₂max), maximal cardiac output (amount of blood pumped every minute), maximal stroke volume (amount of blood pumped with each beat) and blood volume and ability to carry oxygen. Reduced workload on the heart (myocardial oxygen consumption) for any given sub maximal exercise intensity, increased blood supply to

muscles and ability to use oxygen Lower heart rate and blood pressure at any level of sub maximal exercise, threshold for lactic acid accumulation. Lower resting systolic and diastolic blood pressure in people with high blood pressure, Increased HDL Cholesterol (the good cholesterol), Decreased blood triglycerides reduced body fat and improved weight control Improved glucose tolerance and reduced insulin resistance. The main factor that separates anaerobic activity from aerobic activity is oxygen. Anaerobic activity does not require oxygen for fuel while aerobic activity depends on oxygen for fuel. During exercise you can easily tell the difference between the two forms of activity by how you feel. Anaerobic activity cannot be sustained without periods of rest while aerobic activity can be performed continuously. While both are fundamentally different, each are important forms of exercise.

Methodology

The purpose of the study was to find out the effects of aerobic and anaerobic training followed by cessation on total cholesterol of Anna university men players. To achieve this purpose of the study, forty five men students who were studying in various affiliated engineering colleges of Anna university zone VII and who were participated in intercollegiate tournaments during the year 2012-13 were randomly selected as subjects. They were divided into three equal groups of

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each fifteen subjects. The group I underwent aerobic training, group II underwent anaerobic training group and group III acted as control group for three days per week for twelve weeks. Total cholesterol was assessed by lab test. All the subjects of three groups were tested on total cholesterol at prior to and immediately after the training programme as pre and post test. Analysis of covariance (ANCOVA) was used to find out the significant difference if any, among the groups on each selected criterion variables separately. In all the cases

0.05 level of confidence was fixed to test the significance, which was considered as appropriate.

Results

The mean and standard deviation values on Total Cholesterol (TC) of aerobic training, anaerobic training and control group, at six different stages of tests have been analyzed and presented in the following tables.

Table I. The Mean and Standard Deviation on Total Cholesterol (TC) of Pre Test, Post Test and Four Cessations Data of Experimental Groups

Groups		Pre Test	Post Test	First Cessation	Second Cessation	Third Cessation	Fourth Cessation
Aerobic Training Group	Mean	185.333	173.000	175.867	178.800	181.867	188.200
	SD	7.471	7.578	7.220	7.457	7.434	7.308
Anaerobic Training Group	Mean	191.467	183.733	185.533	187.067	189.067	191.533
	SD	6.093	5.861	6.081	5.994	5.958	5.927
Control Group	Mean	194.933	195.067	195.333	195.267	195.400	195.067
	SD	8.738	8.844	9.076	8.672	8.741	9.323

From Table I shows that pre test mean and standard deviation values on Total Cholesterol (TC) for Aerobic Training, Anaerobic Training and Control groups are 185.333 ± 7.471 , 191.467 ± 6.093 and 194.93 ± 8.738 respectively. The post test mean and stand deviation values on Total Cholesterol (TC) for Aerobic Training, Anaerobic Training and Control groups are 173.000 ± 7.578 , 183.733 ± 5.861 and 195.067 ± 8.844 respectively. The first cessation mean and standard deviation values on Total Cholesterol (TC) for Aerobic Training, Anaerobic Training and Control groups are 175.867 ± 7.220 , 185.533 ± 6.081 and 195.333 ± 9.076 respectively. The second cessation mean and standard deviation values on Total Cholesterol (TC) for Aerobic Training, Anaerobic

Training and Control groups are 178.800 ± 7.457 , 187.067 ± 5.994 and 195.267 ± 8.672 respectively. The third cessation mean and standard deviation values on Total Cholesterol (TC) for Aerobic Training, Anaerobic Training and Control groups are 181.867 ± 7.434 , 189.067 ± 5.958 and 195.400 ± 8.741 respectively. The fourth cessation mean and standard deviation values on Total Cholesterol (TC) for Aerobic Training, Anaerobic Training and Control groups are 188.200 ± 7.308 , 191.533 ± 5.927 & 195.067 ± 9.323 respectively. The data of Total Cholesterol (TC) have been analyzed by two way Analysis of Variance (ANOVA) (3x6) with repeated measures on last factor and the obtained results are presented in Table II.

Table II. The Two Way Analysis of Variance on Total Cholesterol (TC) of Aerobic Training, Anaerobic Training and Control Groups at Six Different Stages of Testing Periods

Source of Variance	Sum of Squares	Df	Mean Squares	F-ratio
A factor (Groups)	10302.822	2	5151.411	15.400*
Error I	14048.978	42	334.499	
B factor (Tests)	1686.211	5	337.242	304.446*
AB factor (Interaction) (Groups and Tests)	1017.667	10	101.767	91.870*
Error II	232.622	210	1.108	

**Significant at 0.05 level*

(The table values required for being significant at 0.05 level of confidence with df 2 and 42, 5 and 210 & 10 and 210 were 3.22, 2.56 and 1.87 respectively)

Table II shows that the obtained 'F' ratio value 15.400 for row (groups) on Total Cholesterol (TC) is greater than the required table value 3.22 for significance with df 2 and 42. It further shows that the obtained "F" ratio value 304.446 for column (tests) on Total Cholesterol (TC) is greater than the required table value 2.56 for significance with df 5 and 210. The obtained "F" ratio value of 91.870 for interaction effect (groups x tests) on Total Cholesterol (TC) is also greater than the required table value 1.87 for significance with df 10 and 210. From the

table II, the obtained F value of Interaction A x B (Groups x Different stages of Tests) shows that there is significant difference existing among the paired means of interaction A x B on Total Cholesterol (TC) ($P < 0.05$). The results of the study indicate that there is a significant difference in the interaction effect (between rows (Groups) and columns (Tests)) on Total Cholesterol (TC). Since, the interaction effect was significant, the simple effect test was applied as follow up test and they are presented in Table III.

Table III. The Simple Effect Scores of Groups (Rows) at Three Different Stages of Tests (Columns) on Total Cholesterol (TC)

Source of Variance	Sum of Squares	df	Mean Squares	"F" ratio
Groups Within Pre test	708.978	2	354.489	320.015*
Groups Within Post test	3652.933	2	1826.467	1648.845*
Groups Within First Cessation	2842.178	2	1421.089	1282.890*
Groups Within Second Cessation	2033.644	2	1016.822	917.938*
Groups Within Third Cessation	1375.511	2	687.756	620.872*
Groups Within Fourth Cessation	707.244	2	353.622	319.233*
Tests and Aerobic Training Group	1939.789	5	387.958	350.229*
Tests and Anaerobic Training Group	761.600	5	152.320	137.507*
Tests and Control Group	2.489	5	0.498	0.449
Error II	232.622	210	1.108	

**Significant at 0.05 level*

(The table values required for being significant at 0.05 level of confidence with df 2 and 10, 5 and 10 were 3.04 and 2.26 respectively.)

Table III shows that the obtained F-ratio for Groups within post test, first cessation, second cessation, third cessation and fourth cessation were 1648.845, 1282.890, 917.938, 620.872 and 39.233 indicating that there was a significant difference between the paired means of groups within post test on Total Cholesterol (TC). Table IV shows that F-ratio values obtained for tests within Aerobic Training Group and tests within Anaerobic Training Groups were 350.229 and 137.507 indicating that there was a

significant difference exists among the paired means of tests within Aerobic Training Group and tests within Anaerobic Training Group on Total Cholesterol (TC). Rest of the pairs is not significant. Since, three groups and six different stages of tests were compared, whenever the obtained F-ratio value was found to be significant in the simple effect, the Scheffe's test was applied as post hoc test to find out the paired mean difference.

Table IV. The Scheffe's test for the differences between paired means of post test with different groups on Total Cholesterol (TC)

Aerobic Training Group	Anaerobic Training Group	Control Group	Mean difference	Confidence interval
173.000	183.733		10.733*	0.947
173.000		195.067	22.067*	0.947
	183.733	195.067	11.333*	0.947

**Significant at 0.05 level.*

The above table clearly indicates that the mean difference between Aerobic Training and Anaerobic Training groups, Aerobic Training and Control groups, Anaerobic Training and Control groups, are 10.733, 22.067 and 11.333 respectively. The values are greater than the confidence interval value 0.947, which shows significant difference at 0.05 level of confidence. It

may be concluded from the results of the study that there is a significant difference between the post test means of Aerobic Training and Anaerobic Training groups, Aerobic Training and Control groups, Anaerobic Training and Control groups, on Total Cholesterol (TC) at post test period.

Table V. The Scheffe's test for the differences between paired means of groups on Total Cholesterol (TC) (First Cessation)

Aerobic Training Group	Anaerobic Training Group	Control Group	Mean Difference	Confidence Interval
175.867	185.533		9.667*	0.947
175.867		195.333	19.467*	0.947
	185.533	195.333	9.800*	0.947

** Significant at 0.05 level of confidence*

The Table V shows that the mean difference between Aerobic Training and Anaerobic Training groups, Aerobic Training and Control groups, Anaerobic Training and Control groups are 9.667, 19.467 and 9.800 respectively on Total Cholesterol (TC) after the first cessation of detraining period which are greater than the confidence interval value 0.947 at 0.05 level of

confidence. The results of the study showed that there was a significant difference between Aerobic Training and Anaerobic Training groups, Aerobic Training and Control groups, Anaerobic Training and Control groups on Total Cholesterol (TC) after the first cessation of detraining period.

Table VI. The Scheffe's test for the differences between paired means of groups on Total Cholesterol (TC) (Second Cessation)

Aerobic Training Group	Anaerobic Training Group	Control Group	Mean Difference	Confidence Interval
178.800	187.067		8.267*	0.947
178.800		195.267	16.467*	0.947
	187.067	195.267	8.200*	0.947

** Significant at 0.05 level of confidence*

The Table VI shows that the mean difference between Aerobic Training and

Anaerobic Training groups, Aerobic Training and Control groups, Anaerobic Training and Control groups are 8.267, 16.467 and 8.200 respectively on Total Cholesterol (TC) after the second cessation of detraining period which are greater than the confidence interval value 0.947 at 0.05 level of confidence. The results of the study

showed that there was a significant difference between Aerobic Training and Anaerobic Training groups, Aerobic Training and Control groups, Anaerobic Training and Control groups on Total Cholesterol (TC) after the second cessation of detraining period.

Table VII. The Scheffe's test for the differences between paired means of groups on Total Cholesterol (TC) (Third Cessation)

Aerobic Training Group	Anaerobic Training Group	Control Group	Mean Difference	Confidence Interval
181.867	189.067		7.200*	0.947
181.867		195.400	13.533*	0.947
	189.067	195.400	6.333*	0.947

** Significant at 0.05 level of confidence*

The Table VII shows that the mean difference between Aerobic Training and Anaerobic Training groups, Aerobic Training and Control groups, Anaerobic Training and Control are 7.200, 13.533 and 6.333 respectively on Total Cholesterol (TC) after the third cessation of detraining period which are greater than the confidence interval value 0.947 at 0.05 level of

confidence. The results of the study showed that there was a significant difference between Aerobic Training and Anaerobic Training groups, Aerobic Training and Control groups, Anaerobic Training and Control groups on Total Cholesterol (TC) after the third cessation of detraining period.

Table VIII. The Scheffe's test for the differences between paired means of groups on Total Cholesterol (TC) (Fourth Cessation)

Aerobic Training Group	Anaerobic Training Group	Control Group	Mean Difference	Confidence Interval
185.467	191.533		6.067*	0.947
185.467		195.067	9.600*	0.947
	191.533	195.067	3.533*	0.947

** Significant at 0.05 level of confidence*

The Table VIII shows that the mean difference between Aerobic Training and Anaerobic Training groups, Aerobic Training and Control groups, Anaerobic Training and Control are 6.067, 9.600 and 3.533 respectively on Total Cholesterol (TC) after the fourth cessation of detraining period which are

greater than the confidence interval value 0.947 at 0.05 level of confidence. The results of the study showed that there was a significant difference between Aerobic Training and Control groups, Anaerobic Training and Control groups on Total Cholesterol (TC) after the fourth cessation of detraining period.

Table IX. The Scheffe's test for the differences between paired means of tests on Total Cholesterol (TC) (Aerobic Training Group)

Pre Test	Post Test	First Cessation	Second Cessation	Third Cessation	Fourth Cessation	Mean difference	Confidence Interval
185.333	173.000					12.333*	1.291
185.333		175.867				9.467*	1.291
185.333			178.800			6.533*	1.291
185.333				181.867		3.467*	1.291
185.333					185.467	0.133	1.291

	173.000	175.867				2.867*	1.291
	173.000		178.800			5.800*	1.291
	173.000			181.867		8.867*	1.291
	173.000				185.467	12.467*	1.291
		175.867	178.800			2.933*	1.291
		175.867		181.867		6.000*	1.291
		175.867			185.467	9.600*	1.291
			178.800	181.867		3.067*	1.291
			178.800		185.467	6.667*	1.291
				181.867	185.467	3.600*	1.291

* Significance at 0.05 level of confidence

The Table shows that the mean difference between pre test and post test values, pre test and first cessation values, pre test and second cessation values, pre test and third cessation, post test and first cessation, post test and second cessation, post test and third cessation values, post test and fourth cessation values, first cessation and second cessation values, first cessation and third cessation values, first cessation and fourth cessation values, second cessation and third cessation values, second cessation and fourth cessation values, third cessation and fourth cessation values 12.333, 9.467, 6.533, 3.467, 2.867, 5.800, 8.867, 12.467, 2.933, 6.000, 9.600, 3.067, 6.667 and 3.600 respectively on Total Cholesterol (TC) of Aerobic training Group which are greater than the confidence interval value 1.291 at 0.05 level of confidence. And the mean difference between pre test and fourth cessation values, are

0.1333 on Total Cholesterol (TC) which are less than the confidence interval values 1.291 at 0.05 level of confidence. Hence, the results of the study showed that there was a significant difference between pre test and post test values, pre test and first cessation values, pre test and second cessation values, pre test and third cessation, post test and first cessation, post test and second cessation, post test and third cessation values, post test and fourth cessation values, first cessation and second cessation values, first cessation and third cessation values, first cessation and fourth cessation values, second cessation and third cessation values, second cessation and fourth cessation values, third cessation and fourth cessation values on Total Cholesterol (TC) of Aerobic Training Group. It was also found that there was no significant difference between pre test and fourth cessation values, on Total Cholesterol (TC) of Aerobic training Group.

Table X. The Scheffe’s test for the differences between paired means of tests on Total Cholesterol (TC) (Anaerobic Training Group)

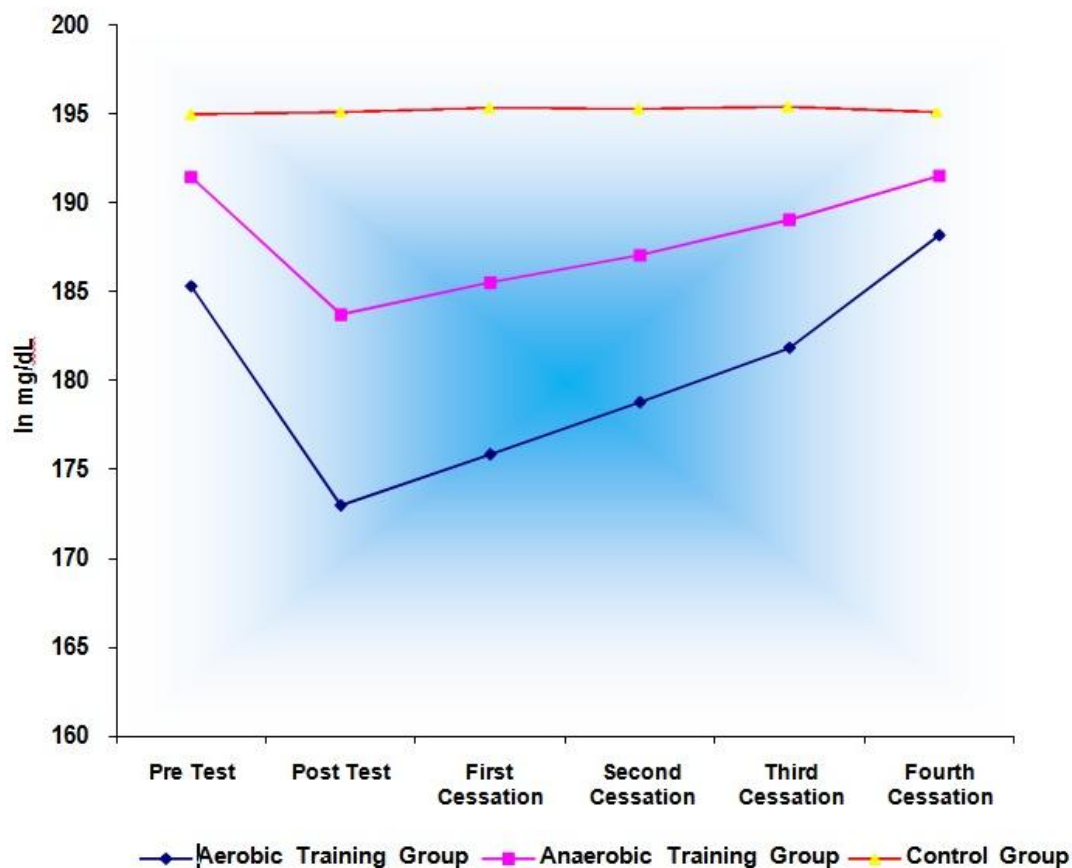
Pre Test	Post Test	First Cessation	Second Cessation	Third Cessation	Fourth Cessation	Mean difference	Confidence Interval
191.467	183.733					7.733*	1.291
191.467		185.533				5.933*	1.291
191.467			187.067			4.400*	1.291
191.467				189.067		2.400*	1.291
191.467					191.533	0.067	1.291
	183.733	185.533				1.800*	1.291
	183.733		187.067			3.333*	1.291
	183.733			189.067		5.333*	1.291
	183.733				191.533	7.800*	1.291
		185.533	187.067			1.533*	1.291
		185.533		189.067		3.533*	1.291
		185.533			191.533	6.000*	1.291
			187.067	189.067		2.000*	1.291
			187.067		191.533	4.467*	1.291
				189.067	191.533	2.467*	1.291

* Significance at 0.05 level of confidence

The Table X shows that the mean difference between pre test and post test values, pre test and first cessation values, pre test and second cessation values, pre test and third cessation, post test and first cessation, post test and second cessation, post test and third cessation values, post test and fourth cessation values, first cessation and second cessation values, first cessation and third cessation values, first cessation and fourth cessation values, second cessation and third cessation values, second cessation and fourth cessation values, third cessation and fourth cessation values 7.733, 5.933, 4.400, 2.400, 1.800, 3.333, 5.333, 7.800, 1.533, 3.533, 6.000, 2.000, 4.467 and 2.467 respectively on Total Cholesterol (TC) of Anaerobic Training Group which are greater than the confidence interval value 1.291 at 0.05 level of confidence. And the mean difference between pre test and fourth cessation values, are 0.067 on Total Cholesterol (TC) which are less than the confidence interval values 1.291 at 0.05 level of confidence. Hence, the results of the study showed that

there was a significant difference between pre test and post test values, pre test and first cessation values, pre test and second cessation values, pre test and third cessation, post test and first cessation, post test and second cessation, post test and third cessation values, post test and fourth cessation values, first cessation and second cessation values, first cessation and third cessation values, first cessation and fourth cessation values, second cessation and third cessation values, second cessation and fourth cessation values, third cessation and fourth cessation values on Total Cholesterol (TC) of Anaerobic Training Group. It was also found that there was no significant difference between pre test and fourth cessation values on Total Cholesterol (TC) of Anaerobic Training Group. The pre & post tests, first, second, third, and fourth cessations mean values of Aerobic training, Anaerobic training, and Control group, on Total Cholesterol (TC) are graphically represented in the Figure I.

Figure I. Mean scores of pre test, post test and four cessations among Aerobic Training, Anaerobic Training and control groups on Total Cholesterol



Conclusion

Based on the limitation and delimitation of the present research study, it was concluded that:

1. The results of the study indicated that the experimental groups namely aerobic training and anaerobic training group had significantly influenced on the performance of the total cholesterol.
2. The control group had no significant differences on total cholesterol.

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