



Effects of Aerobic and Anaerobic Training Followed by Cessation on Fasting Blood Sugar 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 fasting blood sugar 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. Fasting blood sugar was assessed by blood test. All the subjects of three groups were tested on systolic blood pressure 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 fasting blood sugar. The control group had no significant differences on fasting blood sugar.

Keywords: Aerobic, Anaerobic, Cessation, Fasting Blood Sugar.

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Introduction

Aerobics refers to a variety of activities like walking, jogging and running for a measured time. This is sufficient for a short distance runner and yet in short time helps to produce beneficial changes in the body, especially in the action of the lungs, heart and blood circulation. Training to improve aerobic endurance capacity involves four basic elements. Mode, intensity, duration, and frequency of exercise, a training program which does not contain all four to an adequate degree is not likely to be effective. A typical aerobic exercise work out consists of 8 to 10 minutes of stretching, calisthenics and low intensity exercise. This is followed by 15 to 45 minutes of either high or low impact aerobic dancing according to the target training intensity. The heart rate should be monitored at least 6 times during the exercise to ensure that the heart rate stays within the target zone. The 10 minutes cool down period usually includes more stretching and callisthenic type exercise (Hayward, 1989). Anaerobic exercise comprises brief, strength-based activities, such as sprinting or bodybuilding, whereas aerobic exercise is centered around endurance activities, such as marathon running or long-distance cycling. However, the early stage of all exercise is anaerobic.

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Methodology

The purpose of the study was to find out the effects of aerobic and anaerobic training followed by cessation on fasting blood sugar 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. Fasting blood sugar was assessed by blood test. All the subjects of three groups were tested on systolic blood pressure 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 Fasting Blood Sugar of aerobic training, anaerobic training and control group, at six different stages of tests have been analyzed and presented in following tables.

Table I. The Mean and Standard Deviation on Fasting Blood Sugar 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	89.733	79.333	80.200	82.267	86.600	86.400
	SD	7.815	3.200	3.256	3.807	7.109	6.563
Anaerobic Training Group	Mean	94.400	85.267	85.200	87.333	91.333	94.267
	SD	7.443	4.217	3.121	3.599	5.473	7.611
Control Group	Mean	94.333	94.267	95.267	95.067	94.400	95.067
	SD	3.599	3.990	3.535	4.367	2.720	4.527

From Table I shows that pre test mean and standard deviation values on Fasting Blood Sugar for Aerobic Training, Anaerobic Training and Control groups are 89.7333 ± 7.815 , 94.400 ± 7.443 and 94.333 ± 3.599 respectively. The post test mean and standard deviation values on Fasting Blood Sugar for Aerobic Training, Anaerobic Training and Control groups are 79.888 ± 8.200 , 85.267 ± 4.217 and 94.267 ± 8.990 respectively. The first cessation mean and standard deviation values on Fasting Blood Sugar for Aerobic Training, Anaerobic Training and Control groups are 80.200 ± 8.256 , 85.200 ± 8.121 and 95.267 ± 8.585 respectively. The second cessation mean and standard deviation values on Fasting Blood

Sugar for Aerobic Training, Anaerobic Training and Control groups are 82.267 ± 8.807 , 87.888 ± 8.599 and 95.067 ± 4.867 respectively. The third cessation mean and standard deviation values on Fasting Blood Sugar for Aerobic Training, Anaerobic Training and Control groups are 86.600 ± 7.109 , 91.888 ± 5.478 and 94.400 ± 2.720 respectively. The fourth cessation mean and standard deviation values on Fasting Blood Sugar for Aerobic Training, Anaerobic Training and Control groups are 86.400 ± 6.563 , 94.267 ± 7.611 and 95.067 ± 4.527 respectively. The data of Fasting Blood Sugar 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 Fasting Blood Sugar 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)	4651.267	2	2325.633	19.797*
Error I	4933.933	42	117.475	
B factor (Tests)	1918.844	5	383.769	52.489*
AB factor (Interaction)	1032.422	10	103.242	14.121*
Error II	1535.400	210	7.311	

**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 19.797 for row (groups) on Fasting Blood Sugar 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 52.489 for column (tests) on Fasting Blood Sugar is greater than the required table value 2.56 for significance with df 5 and 210. The obtained "F" ratio value of 14.121 for interaction effect (groups x tests) on Fasting Blood Sugar 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 Fasting Blood Sugar ($P < 0.05$). The results of the study indicate that there is a significant difference in the interaction effect (between rows (Groups) and columns (Tests)) on Fasting Blood Sugar. 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 Fasting Blood Sugar

Source of Variance	Sum of Squares	df	Mean Squares	“F” ratio
Groups Within Pre test	214.711	2	107.356	14.683*
Groups Within Post test	1696.044	2	848.022	115.986*
Groups Within First Cessation	1766.711	2	883.356	120.818*
Groups Within Second Cessation	1246.578	2	623.289	85.249*
Groups Within Third Cessation	463.244	2	231.622	31.679*
Groups Within Fourth cessation	296.400	2	148.200	20.270*
Tests and Aerobic Training Group	1569.967	5	313.993	42.946*
Tests and Anaerobic Training Group	1366.367	5	273.273	37.376*
Tests and Control Group	14.933	5	2.987	0.408
Error II	1535.400	210	7.311	-

**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 115.986, 120.818, 85.249, 31.679 and 20.270 indicating that there was a significant difference between the paired means of groups within post test on Fasting Blood Sugar. Table III shows that F-ratio values obtained for tests within Aerobic Training Group and tests within Anaerobic Training Groups were 42.946 and 37.376 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 Fasting Blood Sugar. 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, if any and it has been presented in following tables.

Table IV. The Scheffe's test for the differences between paired means of post test with different groups on Fasting Blood Sugar

Aerobic Training Group	Anaerobic Training Group	Control Group	Mean difference	Confidence interval
79.333	85.267		5.933*	2.434
79.333		94.267	14.933*	2.434
	85.267	94.267	9.000*	2.434

**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 5.933, 14.933 and 9.000 respectively. The values are greater than the confidence interval value 2.434, 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 Fasting Blood Sugar at post test period.

Table V. The Scheffe's test for the differences between paired means of groups on Fasting Blood Sugar (First Cessation)

Aerobic Training Group	Anaerobic Training Group	Control Group	Mean Difference	Confidence Interval
80.200	85.200		5.000*	2.434
80.200		95.267	15.067*	2.434
	85.200	95.267	10.067*	2.434

** 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 5.000, 15.067 and 10.067 respectively on Fasting Blood Sugar after the first cessation of detraining period which are greater than the confidence interval value 2.434 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 Fasting Blood Sugar after the first cessation of detraining period.

Table VI. The Scheffe's test for the differences between paired means of groups on Fasting Blood Sugar (Second Cessation)

Aerobic Training Group	Anaerobic Training Group	Control Group	Mean Difference	Confidence Interval
82.267	87.333		5.067*	2.434
82.267		95.067	12.800*	2.434
	87.333	95.067	7.733*	2.434

** 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 5.067, 12.800 and 7.733 respectively on Fasting Blood Sugar after the second cessation of detraining period which are greater than the confidence interval value 2.434 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 Fasting Blood Sugar after the second cessation of detraining period.

Table VII. The Scheffe's test for the differences between paired means of groups on Fasting Blood Sugar (Third Cessation)

Aerobic Training Group	Anaerobic Training Group	Control Group	Mean Difference	Confidence Interval
86.600	91.333		4.733*	2.434
86.600		94.400	7.800*	2.434
	91.333	94.400	3.067*	2.434

** 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 4.733, 7.800 and 3.067 respectively on Fasting Blood Sugar after the third cessation

of detraining period which are greater than the confidence interval value 2.434 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 detraining period.
Fasting Blood Sugar after the third cessation of

Table VIII. The Scheffe's test for the differences between paired means of groups on Fasting Blood Sugar (Fourth Cessation)

Aerobic Training Group	Anaerobic Training Group	Control Group	Mean Difference	Confidence Interval
89.267	94.267		5.000*	2.434
89.267		95.067	5.800*	2.434
	94.267	95.067	0.800	2.434

** 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, are 5.000 and 5.800 respectively on Fasting Blood Sugar after the fourth cessation of detraining period which are greater than the confidence interval value 2.434 at 0.05 level of confidence. The mean difference between Anaerobic Training and Control groups is 0.800. The value is less

than the confidence interval value 2.434, which shows insignificant difference 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 on Fasting Blood Sugar after the fourth cessation of detraining period. The fourth cessation value of Anaerobic Training and Control groups shows insignificant difference.

Table IX. The Scheffe's test for the differences between paired means of tests on Fasting Blood Sugar (Aerobic Training Group)

Pre Test	Post Test	First Cessation	Second Cessation	Third Cessation	Fourth Cessation	Mean difference	Confidence Interval
89.733	79.333					10.400*	3.318
89.733		80.200				9.533*	3.318
89.733			82.267			7.467*	3.318
89.733				86.600		3.133	3.318
89.733					89.267	0.467	3.318
	79.333	80.200				0.867	3.318
	79.333		82.267			2.933	3.318
	79.333			86.600		7.267*	3.318
	79.333				89.267	9.933*	3.318
		80.200	82.267			2.067	3.318
		80.200		86.600		6.400*	3.318
		80.200			89.267	9.067*	3.318
			82.267	86.600		4.333*	3.318
			82.267		89.267	7.000*	3.318
				86.600	89.267	2.667	3.318

** Significance at 0.05 level of confidence*

The Table IX shows that the mean difference between pre test and post test values, pre test and first cessation values, pre test and second cessation values, post test and third cessation values, post test and fourth 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, 10.400, 6.533, 7.467, 7.267, 9.933,

6.400, 9.067, 4.333, and 7.000 respectively on Fasting Blood Sugar of Aerobic training Group which are greater than the confidence interval value 3.318 at 0.05 level of confidence. And the mean difference between pre test and third cessation, pre test and fourth cessation values, post test and first cessation values, post test and second cessation, first cessation and second cessation values, third cessation and fourth cessation values are 3.133, 0.467, 0.867, 2.933,

2.067 and 2.667 respectively on Fasting Blood Sugar which are less than the confidence interval values 3.318 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, post test and third cessation values, post test and fourth 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, on Fasting Blood Sugar of Aerobic Training Group. It was also found that there was no significant difference between pre test and third cessation, pre test and fourth cessation values, post test and first cessation values, post test and second cessation, first cessation and second cessation values, third cessation and fourth cessation values on Fasting Blood Sugar of Aerobic training Group.

Table X. The Scheffe's test for the differences between paired means of tests on Fasting Blood Sugar (Anaerobic Training Group)

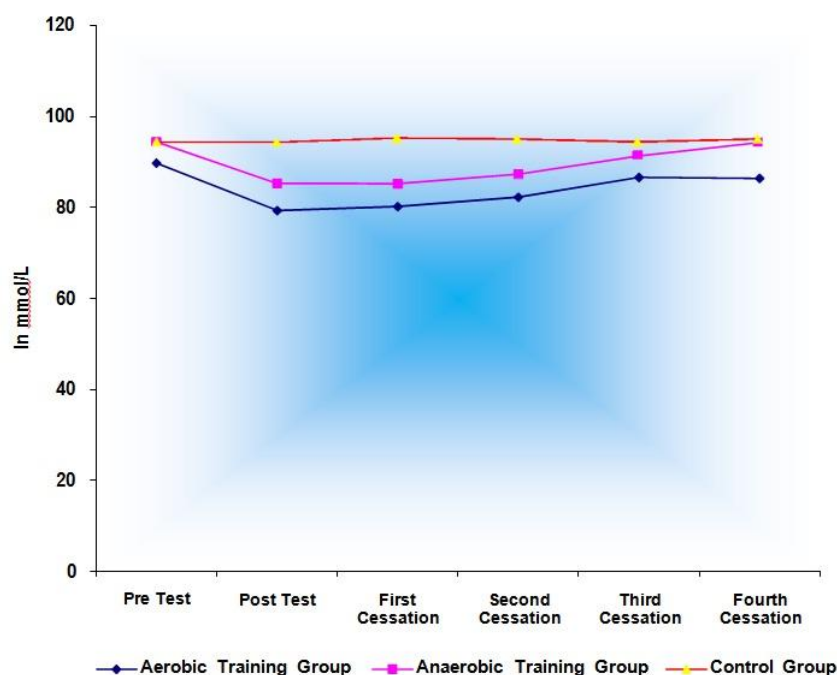
Pre Test	Post Test	First Cessation	Second Cessation	Third Cessation	Fourth Cessation	Mean difference	Confidence Interval
94.400	85.267					9.133*	3.318
94.400		85.200				9.200*	3.318
94.400			87.333			7.067*	3.318
94.400				91.333		3.067	3.318
94.400					94.267	0.133	3.318
	85.267	85.200				0.067	3.318
	85.267		87.333			2.067	3.318
	85.267			91.333		6.067*	3.318
	85.267				94.267	9.000*	3.318
		85.200	87.333			2.133	3.318
		85.200		91.333		6.133*	3.318
		85.200			94.267	9.067*	3.318
			87.333	91.333		4.000*	3.318
			87.333		94.267	6.933*	3.318
				91.333	94.267	2.933	3.318

* 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, post test and third cessation values, post test and fourth 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, 9.133, 9.200, 7.067, 6.067, 9.000, 6.133, 9.067, 4.000 and 6.933 respectively on Fasting Blood Sugar of Anaerobic Training Group which are greater than the confidence interval value 3.318 at 0.05 level of confidence. And the mean difference between pre test and third cessation, pre test and fourth cessation values, post test and first cessation, post test and second cessation values, first cessation and second cessation values, third cessation and fourth cessation values are 3.067, 0.133, 0.067, 2.067, 2.133 and 2.933 respectively on Fasting Blood Sugar which are less than the confidence interval values 3.318 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, post test and third cessation values, post test and fourth 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 on Fasting Blood Sugar of Anaerobic Training Group. It was also found that there was no significant difference between pre test and third cessation, pre test and fourth cessation values, post test and first cessation, post test and second cessation values, first cessation and second cessation values, third cessation and fourth cessation values on Fasting Blood Sugar of Anaerobic Training Group. The pre and post tests, first, second, third, and fourth cessations mean values of Aerobic training, Anaerobic training, and Control group, on Fasting Blood Sugar 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 Fasting Blood Sugar.



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 fasting blood sugar.
2. The control group had no significant differences on fasting blood sugar.

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