Effects of Aerobic and Anaerobic Training on HDL and LDL among men Basketball Players

A. Davis Selva Kumar, Ph.D Research Scholar (Part Time), Department of Physical Education, Thiruvalluvar University, Vellore, Tamilnadu, India.

Dr. P. V. Shelvam, Dean, Faculty of Education, Annamalai University, Chidabaram, Tamilnadu, India.

Abstract

Aim of the present investigation was to find out the effects of aerobic and anaerobic training on selected Bio-chemical components among men Basketball players. To achieve this purpose of the study, forty five (N=45) men Basketball players who have participated in inter Collegiate Basketball tournament, in Thanjavur district of Tamilnadu during the year 2018-2019 were randomly selected as subjects. Their age ranged from 18 to 21 years. The subjects were divided at random into three groups of fifteen in each (n=15). Group-I underwent Aerobic Training, Group-II underwent Anaerobic Training and group-III acted as the Control group. Among various bio-chemical components High Density Lipoprotein (HDL) and Low Density Lipoprotein (LDL) selected as dependent variable and it was assessed through blood sample test. The experimental groups underwent their respective training of 12 weeks duration. All the subjects were tested prior to and immediately after the experimental period on High Density Lipoprotein (HDL) and Low Density Lipoprotein (LDL). The data obtained from the experimental groups before and after the experimental period were statistically analyzed with dependent 't'-test and Analysis of covariance (ANCOVA). Whenever the 'F' ratio for adjusted post assessment means was found to be significant, the Scheffe's Post hoc test was applied to determine the paired mean differences. The level of confidence was fixed at 0.05 level for all the cases. The results of the study showed that Anaerobic Training group has been found to be better than the aerobic training group and Control group in High Density Lipoprotein (HDL) and Low Density Lipoprotein (LDL).

Key words: Aerobic Training, Anaerobic Training, High Density Lipoprotein (HDL), Low Density Lipoprotein (LDL)

INTRODUCTION

Sport and games involve competition. Without competition, there is no game. Competition provides a forum within which people strive to become competent, to become excellent. The opportunities for rivalry within sport are many and varied: team against team, individual against individual, individual against a record, individual now against a previous best performance and an individual against a physical barrier. Competition involves individuals and groups striving for excellence within the rules and traditions that make up a sport, including all the festival characteristics that give the sport additional flavor and meaning.

Sport can provide the basis for a lifelong participation in regular exercise, and the development of mental and moral qualities, including team spirit, sportsmanship, self-discipline, cooperation, commitment, and competing within a framework of agreed rules. Sport can help channel people's energy and aggression in a controlled and constructive way *(Weiss, 1969)*.

Sport training aims at improving the sports performance. The sports performance, as any other type of human performance is not the product of one single system or aspect of human personality.

On the contrary, it is the product of the total personality of the sports person. Therefore the nature and structure of sports performance determine to a great extent the means and methods of training as well as the total planning, organization, implementation and assessment of training. The knowledge about the nature and structure of sports performance must be considered the first and perhaps the most important step towards the successful preparation of sportsmen for higher performance. The process of identification and development of sports talent also has to be based on this knowledge *(Hardayal Singh,1991)*.

Basketball is one of the fastest games in which high level of conditioning and coordinative abilities with technical and tactical potentials are essential to perform every skill at desired or required level. Basketball**,** game played between two teams of five players each on a rectangular court, usually indoors. Each team tries to score by tossing the ball through the opponent's goal, an elevated horizontal hoop and net called a basket *(Shoenfelt, 1991)*.

The most abundant lipoproteins include low density, high density and very low density lipoproteins LDL seems to be the culprit in coronary heart disease and is popularly known as the bad cholesterol by contrast, HDL is increasingly considered desirable and known as the good cholesterol *(Durstine, 2002)*.

METHODOLOGY

The present study was to find out the effects of aerobic and anaerobic training on *High Density Lipoprotein (HDL), Low Density Lipoprotein (LDL)* among male Basketball players. To achieve this purpose of the study, forty five (N=45) men Basketball players who have participated in inter Collegiate Basketball tournament, in Thanjavur district of Tamilnadu during the year 2018-2019 were randomly selected as subjects. The age of the subjects were ranged between 18 to 21 years. The subjects were divided at random into three groups of fifteen in each (n=15). Group-I underwent Aerobic Training, Group-II underwent Anaerobic Training and group-III acted as the Control group. The dependent variables selected for this study was *High Density Lipoprotein (HDL), Low Density Lipoprotein (LDL)*. *High Density Lipoprotein (HDL), Low Density Lipoprotein (LDL)* was assessed by blood sample test. All the subjects were tested prior to and

immediately after the experimental period on the selected dependent variable. All the subjects of the three groups were tested on selected criterion variables at prior to and immediately after the training programme.

ANALYSIS OF THE DATA

The data collected from the experimental groups and control group on prior and after experimentation on selected variables were statistically examined by analysis of covariance (ANCOVA) was used to determine differences, if any among the adjusted post test means on selected criterion variables separately. Whenever they obtained f-ratio value in the simple effect was significant the Scheffe's test was applied as post hoc test to determine the paired mean differences, if any. In all the cases 0.05 level of significance was fixed.

In order to examine the significance differences among Aerobic Training, Anaerobic Training and Control group of *High Density Lipoprotein (HDL)* dependent t- test was applied and it was presented in the Table-1.

Table – 1

Summary of mean standard deviation and dependent 't' test for the pre and post tests on High Density Lipoproteins (HDL) of Experimental groups and Control group

(High Density Lipoproteins (HDL) is expressed in mg/dL)

Test	Descriptive Statistics	Aerobic Training Group	Anaerobic Training Group	Control Group
Pre Test	**Mean**	41.53	41.87	41.88
	SD (±)	3.84	4.05	4.22
Post Test	**Mean**	45.67	49.27	42.07
	SD (±)	3.65	3.96	4.85
"t" Test		**3.02***	**5.06***	**0.12**

**** Significant at 0.05 level.***

The table value required for 0.05 level of significance with df 14 is 2.15.

Table-1 shows that the pre-test mean and standard deviation of High Density Lipoproteins (HDL) values of Aerobic Training group, Anaerobic Training group and Control group are 41.53±3.84, 41.87±4.05 and 41.88±4.22 respectively. The post-test mean and standard deviation are 45.67±3.65, 49.27±3.96 and 42.07±4.85 respectively.

The obtained dependent t-ratio values between the pre and post test means on High Density Lipoproteins (HDL) of Aerobic Training group, Anaerobic Training group and Control group are 3.02, 5.06 and 0.12 respectively. The table value required for significant difference with df 14 at 0.05 level is 2.15. It was concluded that aerobic training group and anaerobic training group had registered significant decrease in High Density Lipoproteins (HDL).

The analysis of covariance on High Density Lipoproteins (HDL) of the pre, post, and adjusted test scores of Aerobic Training group, Anaerobic Training group and Control group have been analyzed and presented in Table – 2.

Table – 2

Computation of Analysis of Covariance of pre test, post test and adjusted post test on High Density Lipoproteins (HDL) of Experimental groups and Control group

Test	Aerobic Training Group	Anaerobic Training Group	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	F-ratio
Pre-Test Mean	41.53	41.87	41.88	Between groups	1.11	2	0.56	0.03
				Within groups	735.20	42	17.50	
Post-Test Mean	45.67	49.27	42.07	Between groups	388.80	2	194.40	10.37*
				Within groups	787.20	42	18.74	
Adjusted Post-Test Mean	45.85	49.17	41.97	Between sets	389.59	2	94.79	29.89*
				Within Sets	267.16	41	6.52	

**** Significant at 0.05 level of confidence***
Table value for df (2, 42) at 0.05 level = 3.22 Table value for df (2, 41) at 0.05 level = 3.23
(High Density Lipoproteins (HDL) scores are in mg/dL)

Table-2 shows that the obtained F-ratio value 0.03 for pre test mean of Aerobic Training group, Anaerobic Training group and Control group on High Density Lipoproteins (HDL) is lesser than the required table value of 3.22 for significance with df 2 and 42 at 0.05 level of confidence. The obtained F-ratio value of 10.37 for post test mean of Aerobic Training group, Anaerobic Training group and Control group on High Density Lipoproteins (HDL) is more than the required table value of 3.22 for significance with df 2 and 42 at 0.05 level of confidence. The obtained F-ratio value of 29.89 for adjusted post test mean of Aerobic Training group, Anaerobic Training group and Control group on High Density Lipoproteins (HDL) is higher than the required table value of 3.23 for significance with df 2 and 41 at 0.05 level of confidence.

The results of the study indicated that there is a significant difference between the adjusted post-test means of Aerobic Training group, Anaerobic Training group and Control group on High Density Lipoproteins (HDL)

Since, three groups are compared and whenever the obtained 'F' ratio for adjusted post test is found to be significant, Scheffe's test is used to find out the paired mean difference and it is presented in Table-3.

Table – 3

Scheffe's test for the difference between paired means on High Density Lipoproteins (HDL)

Aerobic Training Group	Anaerobic Training Group	Control Group	Mean Difference	Confident Interval Value
45.85	49.17	---	3.32*	2.37
45.85	---	41.97	3.88*	2.37
---	49.17	41.97	7.20*	2.37

Significant at 0.05 level of confidence.

Table-3 shows that the mean difference values of Aerobic Training group and Anaerobic Training group, Aerobic Training group and Control group, Anaerobic Training group and Control group are 3.32, 3.88 and 7.20 respectively, which are greater than the confidence interval value of 2.37 on High Density Lipoproteins (HDL) at 0.05 level of confidence.

The results of the study showed that there was a significant difference between Aerobic Training group and Anaerobic Training group, Aerobic Training group and Control group, Anaerobic Training group and Control group on High Density Lipoproteins (HDL).

The above data also reveal that Anaerobic Training group had shown better performance than Aerobic Training group and Control group in High Density Lipoproteins (HDL).

The pre and post test mean values of Aerobic Training group, Anaerobic Training group and Control group on High Density Lipoproteins (HDL) are graphically represented in the Figure -1.

The adjusted post mean values of Aerobic Training group, Anaerobic Training group and Control group on High Density Lipoproteins (HDL) are graphically represented in the Figure -2.

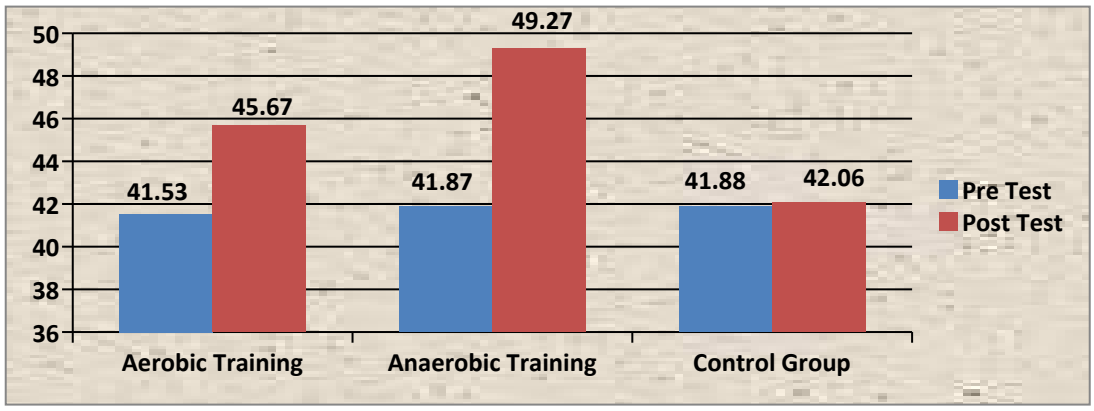

Fig -1 The Pre and Post test Aerobic Training group, Anaerobic Training group and Control group on High Density Lipoproteins (HDL)

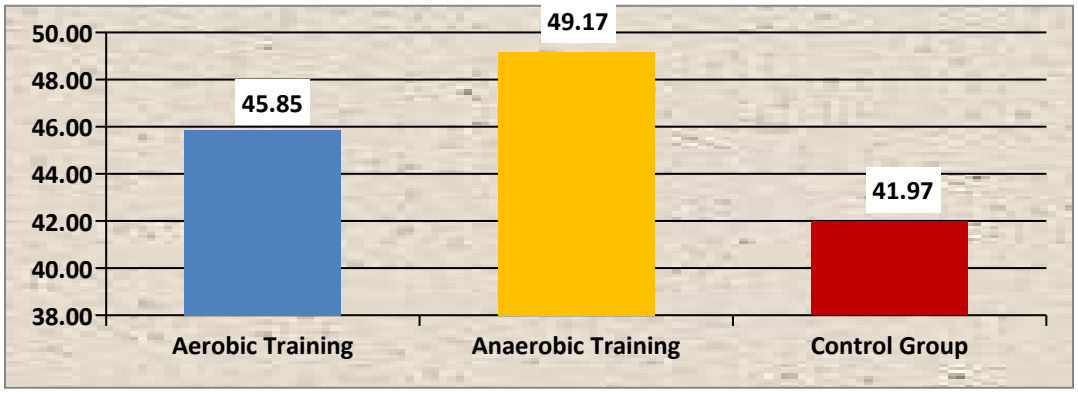

Fig -2 The Adjusted Post Test Mean Values of Aerobic Training group, Anaerobic Training group and Control group on High Density Lipoproteins (HDL)

The results of the dependent 't'-test on the data obtained for Low Density Lipoproteins (LDL) of the subjects in the pre-test and post-test of the Experimental groups and control group have been analyzed and presented in Table-4.

Table – 4

Summary of mean standard deviation and dependent 't' test for the pre and post tests on Low Density Lipoproteins (LDL) of Experimental groups and Control group

(Low Density Lipoproteins (LDL) is expressed in mg/dL)

Test	Descriptive Statistics	Aerobic Training Group	Anaerobic Training Group	Control Group
Pre Test	Mean	134.80	131.73	132.73
	SD (±)	4.82	5.16	5.60
Post Test	Mean	116.40	101.07	133.27
	SD (±)	6.09	4.37	4.43

"t" Test	9.18*	17.56*	0.29

**** Significant at 0.05 level.***

The table value required for 0.05 level of significance with df 14 is 2.15.

Table-4 shows that the pre-test mean and standard deviation of Low Density Lipoproteins (LDL) values of Aerobic Training group, Anaerobic Training group and Control group are 134.80±4.82, 131.73±5.16 and 132.73±5.60 respectively. The post-test mean and standard deviation are 116.40±6.09, 101.07±4.37 and 133.27±4.43 respectively.

The obtained dependent t-ratio values between the pre and post test means on Low Density Lipoproteins (LDL) of Aerobic Training group, Anaerobic Training group and Control group are 9.18, 17.56 and 0.29 respectively. The table value required for significant difference with df 14 at 0.05 level is 2.15.

It was concluded that aerobic training group and anaerobic training group had registered significant decrease in Low Density Lipoproteins (LDL).

The analysis of covariance on Low Density Lipoproteins (LDL) of the pre, post, and adjusted test scores of Aerobic Training group, Anaerobic Training group and Control group have been analyzed and presented in Table – 5.

Table – 5

Computation of Analysis of Covariance of pre test, post test and adjusted post test on Low Density Lipoproteins (LDL) of Experimental groups and Control group

Test	Aerobic Training Group	Anaerobic Training Group	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	F-ratio
Pre-Test Mean	134.80	131.73	132.73	Between Groups	73.38	2	36.69	1.26
				Within groups	1218.27	42	29.01	
Post-Test Mean	116.40	101.07	133.27	Between groups	7782.18	2	3891.09	143.68*
				Within groups	1137.47	42	27.08	
Adjusted Post-Test Mean	115.61	101.69	133.43	Between sets	7566.50	2	3783.25	176.17*
				Within Sets	880.48	41	221.48	

**** Significant at 0.05 level of confidence***
Table value for df (2, 42) at 0.05 level = 3.22 Table value for df (2, 41) at 0.05 level = 3.23
(Low Density Lipoproteins (LDL) scores are in mg/dL)

Table-5 shows that the obtained F-ratio value 1.26 for pre test mean of Aerobic Training group, Anaerobic Training group and Control group on Low Density Lipoproteins (LDL) is lesser than the required table value of 3.22 for significance with df 2 and 42 at 0.05 level of confidence.

The obtained F-ratio value of 143.68 for post test mean of Aerobic Training group, Anaerobic Training group and Control group on Low Density Lipoproteins (LDL) is more than

the required table value of 3.22 for significance with df 2 and 42 at 0.05 level of confidence. The obtained F-ratio value of 176.17 for adjusted post test mean of Aerobic Training group, Anaerobic Training group and Control group on Low Density Lipoproteins (LDL) is higher than the required table value of 3.23 for significance with df 2 and 41 at 0.05 level of confidence.

The results of the study indicated that there is a significant difference between the adjusted post-test means of Aerobic Training group, Anaerobic Training group and Control group on Low Density Lipoproteins (LDL).

Since, three groups are compared and whenever the obtained 'F' ratio for adjusted post test is found to be significant, Scheffe's test is used to find out the paired mean difference and it is presented in Table-6.

Table – 6

Scheffe's test for the difference between paired means on Low Density Lipoproteins (LDL)

Aerobic Training Group	Anaerobic Training Group	Control Group	Mean Difference	Confident Interval Value
115.61	101.69	---	13.92*	4.30
115.61	---	133.43	17.82*	4.30
---	101.69	133.43	31.74*	4.30

Significant at 0.05 level of confidence.

Table-6 shows that the mean difference values of Aerobic Training group and Anaerobic Training group, Aerobic Training group and Control group, Anaerobic Training group and Control group are 13.92, 17.82 and 31.74 respectively, which are greater than the confidence interval value of 4.30 on Low Density Lipoproteins (LDL) at 0.05 level of confidence.

The results of the study showed that there was a significant difference between Aerobic Training group and Anaerobic Training group, Aerobic Training group and Control group, Anaerobic Training group and Control group on Low Density Lipoproteins (LDL).

The above data also reveal that Anaerobic Training group had shown better performance than Aerobic Training group and Control group in Low Density Lipoproteins (LDL).

The pre and post test mean values of Aerobic Training group, Anaerobic Training group and Control group on Low Density Lipoproteins (LDL) are graphically represented in the Figure -3.

The adjusted post mean values of Aerobic Training group, Anaerobic Training group and Control group on Low Density Lipoproteins (LDL) are graphically represented in the Figure -4.

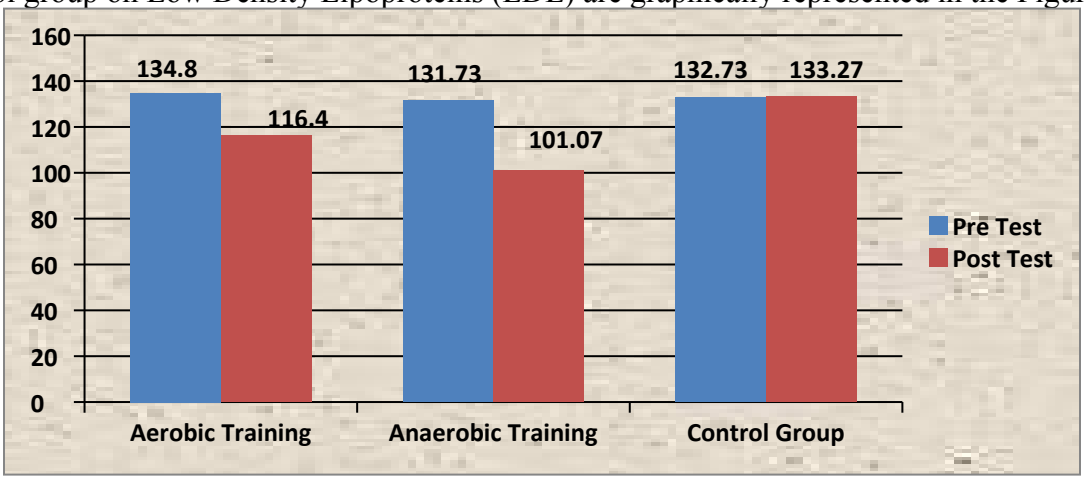

Fig -3 The Pre and Post test Aerobic Training group, Anaerobic Training group and Control group on Low Density Lipoproteins (LDL)

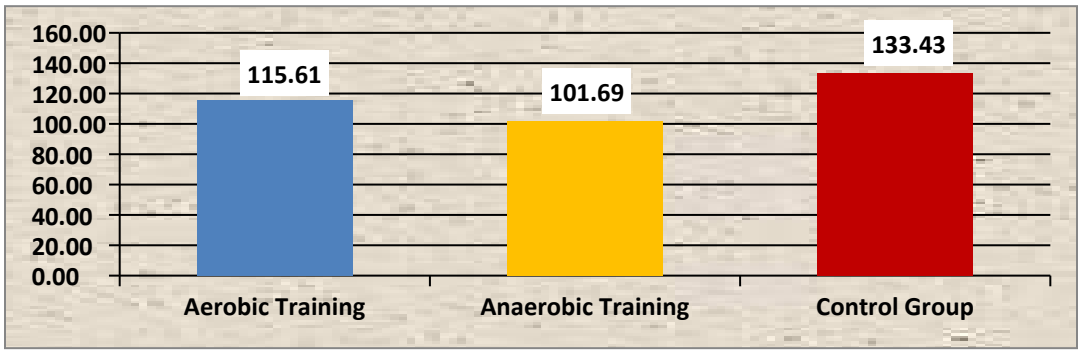

Fig -4 The Adjusted Post Test Mean Values of Aerobic Training group, Anaerobic Training group and Control group on Low Density Lipoproteins (LDL)

CONCLUSIONS

From the analysis of the data, the following conclusions were drawn.

1. The Aerobic Training group and Anaerobic Resistance Training group had registered significant changes on High Density Lipoproteins Cholesterol (HDL) and Low Density Lipoproteins Cholesterol (LDL).
2. When the experimental groups were compared with each other, the Anaerobic Training group was found to be greater than the Aerobic Training programme, and Control group on the decrease of selected criterion variable namely High Density Lipoproteins Cholesterol (HDL) and Low Density Lipoproteins Cholesterol (LDL).

DISCUSSIONS

The results of the study showed that anaerobic training and aerobic training groups have significantlly differed on HDL and LDL when compared to control group, and also between the training

groups anaerobic training group was found to be greater than the aerobic training group. Hence it was concluded that both anaerobic training and aerobic training was better method to improve the HDL and LDL.

Manna and others found out the significant increase ($P<0.05$) in HDL-C; and significant decrease ($P<0.05$) in LDL-C were noted after training. A recent study showed significant increase in HDL-C level and decrease in LDL-C level, after 9 weeks of training (Degoutte et al., 2006). Another study reported that 4 weeks of aerobic exercise training significantly decreased the levels of LDL-C, and increased HDL-C (Altena et al., 2006). Leon and Sanchez(2001) conducted a meta-analysis of 51 interventions involving 12 weeks or more of aerobic exercise ($n = 4,700$). It was reported that, on average, HDL cholesterol increased by 4.6 % and LDL cholesterol fell by 5 %. The HDL:LDL cholesterol ratio improved considerably, suggesting that the increased intensity and structure normally associated with aerobic exercise has a more consistent impact upon LDL cholesterol than moderate levels of physical activity.

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