



EFFECT OF VARIOUS TRAINING PROGRAMME ON HIGH AND LOW DENSITY LIPOPROTEIN IN MIDDLE AGED MEN

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Abstract

The aim of the research was to find out effect of walking, jogging and running training programme on high and low density lipoprotein in middle aged men. For this purpose, forty middle aged men staff members of faculty of Agriculture, Annamalai University, Chidambaram, Tamil Nadu, India were randomly selected as subjects and their age ranged between 35 to 45 years. This study consisted of three experimental variables namely walking, jogging and running training programme and one criterion variables such as high density lipoprotein and low density lipoprotein. The allotment of groups was done at random, thus Group-I underwent walking training programme, Group-II underwent jogging training programme, Group-III underwent running training programme for three days per week for twelve weeks, Group-IV acted as control. All the subjects were tested prior to and after the experimentation period. The collected data were statistically treated by using ANCOVA, and 0.05 level of confidence was fixed to test the significance. When the obtained 'F' ratio was significant, Scheffe's post hoc test was used to find out the paired mean difference. The results of the study revealed that all three experimental groups showed significant reduction in low density lipoprotein and significant improvement in high density lipoprotein as compared to control group. The walking group showed significant reduction in low density lipoprotein and significant improvement in high density lipoprotein as compared to jogging and running groups. There is no significant reduction in low density lipoprotein and insignificant improvement in high density lipoprotein between jogging and running groups.

Keywords: Walking, Jogging, Running, Training, High Density Lipoprotein and Low Density Lipoprotein.

INTRODUCTION

Cholesterol plays a major role in human heart health. Cholesterol can be both good and bad. High-density lipoprotein (HDL) is good cholesterol and low-density lipoprotein (LDL) is bad cholesterol. High cholesterol in serum is a leading risk factor for human cardiovascular disease such as coronary heart disease (CHD) (Gandapur et al., 2006). High levels of high-density lipoprotein (HDL), low levels of low-density lipoprotein (LDL), and low levels of very-low-density lipoprotein (VLDL) are all associated with a low risk of coronary heart disease (CHD) The well-defined and regular performed aerobic exercise also reduces LDL cholesterol and, the risk factors of CHD (Hsieh et al., 1998). On the other hand, (Durstin et al., 2001) found that duration of aerobic exercise (e.g., number of miles run), rather than the intensity, appears to have the biggest influence on HDL-C levels. The primary reason for the elevation in HDL-C is an increase in lipoprotein lipase activity in response to exercise. Lipoprotein lipase accelerates the breakdowns of triglycerides, resulting in a transfer of cholesterol and other substances to the HDL-C (Tokmakidis et al., 2003).

Walking is one of the simplest forms of exercise with the added benefit of relieving many health problems at essentially no cost other than a small amount of time which can actually be very enjoyable. In addition, Kokkinos and colleagues studied 2906 men and reported

that increases in HDL-C levels occurred in men *jogging* at an exercise intensity of 10 to 11 minutes per mile. High levels of high-density lipoprotein (HDL), low levels of low-density lipoprotein (LDL), and low levels of very-low-density lipoprotein (VLDL) are all associated with a low risk of coronary heart disease (CHD). As compared with sedentary men, endurance runners have higher plasma concentrations of HDL2 and lower concentrations of small LDL and VLDL, suggesting that exercise may reduce CHD risk. The research was to find out effect of walking, jogging and running training programme on high and low density lipoprotein in middle aged men.

METHODOLOGY

The present study was to find out the effect of walking, jogging and running training programme on high density lipoprotein and low density lipoprotein. For this purpose forty middle aged men staff member who did not involve in any vigorous and special physical training programme, working in faculty of Agriculture, Annamalai University, Annamalai Nagar, Chidambaram, Tamil Nadu, India were randomly selected as subjects and their age ranged from 35 to 45 years. The selected subjects were divided into four groups of ten each.

TRAINING PROGRAMME

During the training period, group-I underwent walking, group-II underwent jogging and group-III underwent running. The subjects of three experimental groups underwent their respective training programme for twelve weeks. On every day of the training session the training schedule done were approximately from

thirty-five to fifty-five minutes, this included warming up and warming down. Group-IV was instructed not to participate in any strenuous physical exercises and requested to do regular work throughout of the study. The training schedule for the experimental groups is presented in table- I.

**TABLE- I
TRAINING SCHEDULE FOR THE EXPERIMENTAL GROUPS**

Weeks		I -	III -	V -	VII -	IX - X	XI -
Walking Group		3200	3500	3800	4100	4400	4700
Jogging Group	Jogging	800	900	1000	1100	1200	1300
	Relax walking	400	400	400	400	400	400
	Jogging	800	900	1000	1100	1200	1300
	Relax walking	400	400	400	400	400	400
	Jogging	800	900	1000	1100	1200	1300
Running Group	Jogging	700	800	900	1000	1100	1200
	Relax walking	500	500	500	500	500	500
	Jogging	700	800	900	1000	1100	1200
	Relax walking	500	500	500	500	500	500
	Jogging	700	800	900	1000	1100	1200

❖ All measurements used in meter.

❖ 5 minutes warm up before and 5 minutes cool down after commencement of the training programme.

STATISTICAL ANALYSIS

All the subjects were tested on high density lipoprotein and low density lipoprotein by using Enzymatic Colorimetric Method before and after the commencement of the training programme. To nullify the variation in the pre-test means, analysis of covariance (ANCOVA) was applied and the adjusted post-test means were tested for significance. If the 'F' ratio was significant Scheffe's post-hoc test was applied to find out

the significant differences if any, among the paired means. The level of significance was set at 0.05 level.

RESULTS OF THE STUDY

The data collected during pre and post-tests among walking, jogging, running groups and control group on high density lipoprotein and low density lipoprotein have been analysed statistically and the results are shown in table-II.

HIGH DENSITY LIPOPROTEIN

TABLE-II

ANALYSIS OF COVARIANCE FOR PRE- AND POST-TEST DATA ON HIGH & LOW DENSITY LIPOPROTEIN AMONG WALKING, JOGGING, RUNNING GROUPS AND CONTROL GROUP

		Walki ng group	Joggin g group	Runni ng group	Contr ol group	SO V	Sum of squares	df	Mean squar e	'F' ratio
HIGH DENSITY	Pre-Test									
	Mean	40.70	41.80	41.20	41.30	B:	6.10	3	2.03	0.14
	SD	3.30	3.58	4.24	4.00	W:	519.40	36	14.43	
	Post-Test									
Mean	45.90	44.40	43.80	41.60	B:	95.48	3	31.83	2.70	
SD	2.33	3.60	3.90	3.80	W:	429.30	36	11.93		

	Adjusted Post-Test Mean	46.34	44.00	43.84	41.56	B: W:	113.77 102.33	3 35	37.92 2.92	13.00*
LOW DENSITY LIPOPROTEIN	Pre-Test Mean	122.86	123.20	124.28	123.10	B:	12.00	3	4.00	0.03
	SD	9.10	11.44	11.90	12.35	W:	4558.04	36	126.61	
	Post-Test Mean	112.42	118.14	119.20	123.22	B:	596.04	3	198.68	1.60
	SD	8.10	10.76	10.27	14.71	W:	4525.92	36	125.72	
	Adjusted Post-Test Mean	112.90	118.29	118.30	123.50	B: W:	560.44 232.76	3 35	186.81 6.65	28.10*

* Significant at 0.05 level of confidence.

df-degrees of freedom; SD-Standard Deviation; S.O.V.-Source of Variance. B-Between; W-Within

The table value required for significance at 0.05 level with df 3 & 56, and 3 & 55 are 2.87 and 2.87 respectively.

HIGH DENSITY LIPOPROTEIN

Table-II shows that the adjusted post-test mean values for walking group is 46.34, jogging group is 44.00, running group is 43.84 and control group is 41.56, which have an ‘F’ ratio of 13.00 and it is higher than the table value of 2.87 required for df 3 and 35 at 0.05 level of significance. It is found that significant differences exist among the four groups on high density lipoprotein after adjusting the initial mean differences on the post-test means.

LOW DENSITY LIPOPROTEIN

Table-III further shows that the adjusted post-test mean values for walking group is 112.90, jogging group is 118.29, running group is 118.30 and control group is 123.50, which have an ‘F’ ratio of 28.10 and it is higher than the table value of 2.87 required for df 3 and 35 at 0.05 level of significance. It is found that significant differences exist among the four groups on low density lipoprotein after adjusting the initial mean differences on the post-test means. In order to determine which of the paired means have significant differences, Scheffe’s test was computed and it is presented in table-III.

**TABLE -III
SCHEFFE’S TEST FOR THE DIFFERENCES BETWEEN THE ADJUSTED POST-TEST PAIRED MEANS OF HIGH & LOW DENSITY LIPOPROTEIN**

	Adjusted Post-Test Means				Means Differences	Confidence Interval
	Walking group	Jogging group	Running group	Control group		
HIGH DENSITY LIPOPROTEIN	46.34			41.56	4.78*	2.24
		44.00		41.56	2.44*	2.24
			43.84	41.56	2.28*	2.24
	46.34	44.00			2.34*	2.24
	46.34		43.84		2.50*	2.24
		44.00	43.84		0.16	2.24
LOW DENSITY LIPOPROTEIN	112.90			123.50	10.6*	3.38
		118.29		123.50	5.21*	3.38
			118.30	123.50	5.20*	3.38
	112.90	118.29			5.39*	3.38
	112.90		118.30		5.40*	3.38
		118.29	118.30		0.01	3.38

* Significant at 0.05 level.

HIGH DENSITY LIPOPROTEIN

An examination of the table-III indicates that the adjusted post-test mean difference of high density lipoprotein between control group and walking group, control group and jogging group and between control group and running group are 4.78, 2.44 and 2.28, respectively which are higher than the confidence interval value of 2.24, at 0.05 level of significance. It is inferred that the twelve weeks of walking, jogging and running training programme have significantly increased the high density lipoprotein in three experimental groups as compared to the control group.

Table-2 also shows the mean difference between walking group and jogging group is 2.34, walking group and running group 2.50 which are higher than the confidence interval value 2.24 at 0.05 level of significance. Hence it is concluded that significant increase exists in high density lipoprotein for walking group compared to jogging and running groups.

The mean difference between jogging group and running groups is 0.16 and it is lower than confidence interval value of 2.00 at 0.05 level of significance. The result shows that no significant difference exists in high density lipoprotein among these two groups.

LOW DENSITY LIPOPROTEIN

An examination of the table-2 indicates that the adjusted post-test mean difference of low density lipoprotein between control group and walking group, control group and jogging group and between control group and running group are 10.60, 5.21 and 5.20, respectively which are higher than the confidence interval value of 3.38, at 0.05 level of significance. It is inferred that the twelve weeks of walking, jogging and running training programme have significantly decreased the low density lipoprotein in three experimental groups as compared to the control group.

Table-2 also shows the mean difference between walking group and jogging group is 5.39, walking group and running group is 5.40 which are higher than the confidence interval value 3.38 at 0.05 level of significance. Hence it is concluded that no significant difference exists in low density lipoprotein among the groups.

The mean difference between jogging group and running groups is 0.01 and it is lower than confidence interval value of 3.38 at 0.05 level of significance. The result shows that no significant difference exists in low density lipoprotein among these two groups.

DISCUSSION ON FINDINGS

Walking, jogging and running training programme groups showed significant reduction in low density lipoprotein and significant improvement in high density lipoprotein as compared to control group after 12 weeks of training programme.

The walking programme showed significant increase in high density lipoprotein and significant decrease in low density lipoprotein compared to jogging and running group. The jogging group showed

insignificant increase in high density lipoprotein and insignificant decrease in low density lipoprotein compared to running group.

The following literatures have shown that the systematic walking, jogging and running training programmes produced significant improvements in high density lipoprotein and low density lipoprotein compared to control group among middle aged men.

(Gandapur, 2006), (Batty and Lee, 2004), (Dumortier, 2003), (Gill et al., 2003), (Jafari et al., 2003), (Garvey, 2003), (Durstine et al., 2001), (Dengel et al., 1998), (Hardman and Hudson, 1994), (Hardman, 1994), (Marti et al., 1990), (Suter et al., 1990) and (Stein et al., 1990).

CONCLUSIONS

The following conclusions were drawn from the results of the study:

- Walking, jogging and running training programme groups showed significant reduction in low density lipoprotein and significant improvement in high density lipoprotein as compared to control group.
- Walking group showed significant reduction in blood glucose, total cholesterol, triglycerides, low density lipoprotein and insignificant improvement in high density lipoprotein as compared to jogging and running groups.
- The jogging group showed insignificant increase in high density lipoprotein and significant decrease in low density lipoprotein compared to running group.

REFERENCES

1. Batty, G.D. and I.M. Lee. "Physical activity and coronary heart disease." *BMJ*. 328: (2004).
2. Dengel, D.R. and J.M. Hagberg, R.E. Pratley, E.M. Rogus, A.P. Goldberg. "Improvements in blood pressure, glucose metabolism, and lipoprotein lipids after aerobic exercise plus weight loss in obese, hypertensive middle-aged men." *Metabolism*. 47: (1998).
3. Dumortier, M. and F. Brandou, A. Perez-Martin, C.Fedou, J.Mercier J.F. Brun. "Low intensity endurance exercise targeted for lipid oxidation improves body composition and insulin sensitivity in patients with the metabolic syndrome." *Diabetes Metabolism*.29: (2003).
4. Gandapur, A.S. and M. Manan, G. Nazir, N. Uzma, J.A. Chawla, A. Jadoon. "Comparison of lipid profile and apoprotein in sedentary workers and those involved in regular exercise." *Jour. Ayub. Med.Coll. Abbott bad*. 18(4):(2006).
5. Garvey, W.T. and S. Kwon, D. Zheng, S. Shaughnessy, P. Wallace, A. Hutto, et al. "Effects of insulin resistance and type 2 diabetes on lipoprotein subclass particle size and concentration determined by nuclear magnetic resonance." *Diabetes*. 52: (2003).
6. Gill, J.M. et al., "Effects of a brisk walk on lipoprotein lipase activity and plasma triglyceride

- concentrations in the fasted and postprandial states.”
European Journal of Applied Physiology. 89(2):
(2003).
7. Hardman, A.E. and Hudson, A. “Brisk walking and serum lipid and lipoprotein variables in previously sedentary women-effect of 12 weeks of regular brisk walking followed by 12 weeks of detraining.” *British Journal of Sports Medicine.* 28(4): (1994).
 8. Hsieh, SD. and H. Yoshinaga, T. Muto, Y. Sakurai. “Regular Physical Activity and Coronary Risk Factors in Japanese Men.” *Circulation.* 97:(1998).
 9. Jafari, M. et al., “Evaluated the effects of physical exercise on plasma prebeta-1 high-density lipoprotein.” *Metabolism.* 52(4): (2003).
 10. Marti, B., et al., “Effects of long-term, self-monitored exercise on the serum lipoprotein and apolipoprotein profile in middle-aged men.” *Atherosclerosis.* 81(1): (1990).
 11. Stein, R.A. et al. “Effect of Different Exercise Training Intensities on Lipoprotein Cholesterol Fractions in Healthy Middle Aged Men.” *American Heart Journal.* 119(2): (1990).
 12. Suter, E. et al., “The effects of self monitored jogging on physical fitness, blood pressure and serum lipids: a controlled study in sedentary middle-aged man.” *International Journal of Sports Medicine.* 11(6): (1990).
 13. Tokmakidis, S.P. and K.A. Volakis. *Jour. Cardiopulm. Rehabil.* 23(3):(2003).