IMPACT OF 18 WEEK AEROBIC TRAINING ON LIPID PROFILE OF YOUTH

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ABSTRACT
The aim of the study was to find out the impact of 18-weeks moderate aerobic exercise programme on lipid profile in the middle-aged male and female. The 40 middle-aged men were randomly assigned to exercise (n= 20) and control groups (n= 20) and age ranged from 45 to 40 years. While the exercise group participated in 18 weeks physical exercise program (walking or cycling), the control group maintained their previous exercise habits. Serum triglycerides decreased from 1.50 ± 0.11 to 1.28 ± 0.07 mmol/l ($p<0.01$) and high-density lipoprotein cholesterol increased from 1.20 ± 0.04 to 1.41 ± 0.03 mmol/l ($p<0.01$) in the exercise group after 18 weeks exercise intervention. It is concluded that the change in lipid profile (triglycerides) in the exercise group was not dependent on weight reduction but high-density lipoprotein cholesterol changed based on weight reduction.
Keywords: Serum lipoproteins, physical exercise, middle aged men.

INTRODUCTION
Our knowledge and understanding of objects and the world have increased tremendously. In the process, however, man ignored his emotional patterning in life. As a result, in spite of plenty of wealth, physical comfort, and knowledge of sources of energy, space and communication skills, man is dissatisfied, disturbed and unhappy. Selfishness, greed, wrath and lust are playing havoc. They have given rise to distrust, insecurity, anxiety, stress and conflict, and have made individuals and society restless and emotionally and socially weaker. The physical inactivity results in a reduced cardio-respiratory endurance which further contribute to risk of coronary heart disease, CHD. Among the various proposed mechanisms for the protective effect of regular physical activity against CHD is a favorable effect on blood lipids, particularly an increase in high-density lipoprotein cholesterol (HDL-C) and a reduction in triglyceride (TG) levels. Physical Exercise, primarily aerobic exercise, is a low-cost therapeutic lifestyle change that has been recommended for improving lipid and lipoprotein levels in adults. While results of the previous research studies has reported significant improvements in lipids and lipoproteins among men as a result of aerobic exercise on lipids and lipoproteins in adults have been underwhelming. Previous randomized controlled trials addressing the effects of exercise on lipid and lipoprotein outcomes have reported conflicting findings with regards to HDL-C and TG. Several of these studies have investigated the effects of combined physical exercise and diet on lipids and lipoproteins but few have looked at the effects of physical exercise alone. Given the conflicting findings regarding the effects of exercise on lipids and lipoproteins in adults, in this study, the author aimed to determine the effect of mild-to-moderate 18 weeks aerobic exercise programme on lipid profile in middle-aged men.

MATERIAL AND METHODS
Subjects
The subjects were 40 men and female aged between 45 to 50 years. All participants were volunteers and had been physically rather inactive during the year preceding the study. Persons who were taking any kind

of medications and persons with cardiac or other medical disorders that would contraindicate physical training were excluded. All participants gave informed consent before the study.

Design

A questionnaire about physical activity behaviour, smoking and alcohol consumption level (1-month recall) was administered to the participants in the beginning of the study. Blood sample was drawn for lipid profile in the morning after an overnight fast. Dietary instructions that recommended reduced usage of saturated fats and simple carbohydrates and avoidance of excessive alcohol consumption were given all subjects. Weight loss was not encouraged. These recommendations were made to make the diet of the test persons as uniform as possible and to avoid nonspecific diet-induced changes later during the tests. After these determinations 60 participants selected and randomly assigned to two groups: Exercise group and control group. The biochemical testing was repeated on all subjects 18 weeks after the beginning of the intervention. The subjects were advised to avoid physical exercise on the day before the tests.

Intervention (training) program

The subjects assigned to the exercise group were given an individualized training program that consisted of walking, or cycling. During 18 weeks the program included workout of three days per week. The subjects were instructed to determine their training heart rates from 10 s pulse counts estimated several times during the exercise. The prescribed intensity during the training period was calculated from the modified Balke's formula (Balke, 1974): resting heart rate + 0.40 X (maximal heart rate - resting heart rate). The participants were advised to have a warm-up period of 10 minute before and a 10 minute cool-down period after the 25 minute exercise period.

Lipid Profile Testing

Cholesterol and triglyceride concentration in serum was measured by an Autoanalyzer using standard testing kits by the laboratory technician.

STATISTICAL METHODS

The results were mean ± SD. Differences in the mean values were tested with the t test and a paired t test and moreover, the correlations (Pearson) between parameters were analyzed.

RESULTS

The triglyceride level was significantly lower in exercise group than in control group at the end of the training (1.28 ± 0.07 mmol/l vs 1.50 ± 0.11 mmol/l, $p < 0.05$), whereas HDL cholesterol level in exercise group (1.41 ± 0.03 mmol/l) was significantly higher than control group (1.20 ± 0.04 mmol/l) (Table 2). The correlations between the changes in serum triglycerides, HDL cholesterol and body weight in exercise group after the training period are shown in Table 3. A significant negative correlation was observed between the changes in HDL cholesterol and fasting serum triglycerides ($r = -0.42$). Furthermore, a positive correlation ($r = 0.39$) was present between the changes in HDL cholesterol and body weight. On the other hand there were not correlations between triglycerides-body weight ($r = -0.15$).

TABLE NO.1
GROUP COMPARISONS OF BODY WEIGHT AND LIPID PROFILE

VARIABLES	EXERCISE GROUP		CONTROL GROUP	
	Before	After 18-wks	Before 18-wks	After18-wks
Body weight (kg)	79.6 ± 1.3	78.8 ± 1.7	80.7 ± 1.5	81.2 ± 1.8
Cholesterol (mmol/l)	7.7 ± 0.4	6.9 ± 0.3	7.9 ± 0.3	7.2 ± 0.6
Triglycerides (mmol/l)	1.50 ± 0.11	1.28 ± 0.07**	1.45 ± 0.11	1.57 ± 0.15
VLDL cholesterol (mmol/l)	0.66 ± 0.08	0.62 ± 0.07	0.57 ± 0.09	0.55 ± 0.04
LDL cholesterol (mmol/l)	4.5 ± 0.3	4.3 ± 0.6	4.5 ± 0.2	4.4 ± 0.1
HDL cholesterol (mmol/l)	1.20 ± 0.04	1.41 ± 0.03**	1.23 ± 0.07	1.25 ± 0.06

TABLE NO.2
CORRELATIONS BETWEEN BODY WEIGHT AND THE CHANGES IN LIPID PROFILE IN EXERCISE GROUP

VARIABLES	CORRELATION COEFFICIENT 'r'
HDL Cholesterol-Body Weight	0.39*
HDL Cholesterol-Triglycerides	-0.42*
Triglycerides-Body Weight	-0.15

DISCUSSION

A decrease in serum triglycerides after exercise has been described in the study of Larson-Meyer et al. (2008). In another one, Slentz et al. (2007) did a research covered sedentary, overweight subjects (n = 240) were randomized to 6-month control or one of three exercise groups: 1) high-amount/vigorous-intensity exercise; 2) low-amount/vigorous-intensity exercise; or 3) low amount/ moderate-intensity exercise. Moderate-intensity but not vigorous-intensity exercise resulted in a sustained reduction in triglyceride over 15 days of detraining. Yet, exercise-induced reduction in serum triglyceride concentration is not clear. The decrease cannot be attributed solely to weight reduction. It was earlier shown that serum triglyceride concentration decreases during an exercise program, even though the participants increase their caloric intake to compensate for additional caloric expenditure (Lapman et al., 1977).The exercise group had an increase in HDL cholesterol after training programme. Several previous investigations have reported high serum HDL cholesterol levels in subjects who practice strenuous physical exercise (Fahlman et al., 2002; Fenkci et al., 2006). In Slentz et al's study (2007), continued inactivity resulted in significant increases in low-density lipoprotein (LDL) particle number, small dense LDL, and LDL-cholesterol. A modest amount of exercise training prevented this deterioration. The high-amount group had significant improvements in high-density lipoprotein (HDL)- cholesterol, HDL particle size, and large HDL levels that were sustained for 15 days after exercise stopped. They concluded that physical inactivity has profound negative effects on lipoprotein metabolism. Modest exercise prevented this. Thirty minutes per day of vigorous exercise, like jogging, has sustained beneficial effects on HDL metabolism. Kodama et al (2007) reported that minimal weekly exercise volume for increasing HDL-C level was estimated to be 120 minute and every 10-minute prolongation of exercise per session was associated with an approximately 1.4-mg/dL (0.036-mmol/L) increase in HDL-C level. In contrast, there was no significant association between exercise frequency or intensity. The general conclusion was that regular aerobic exercise increases HDL-C level (Maesta et al., 2007; Katznelson et al., 2006). There is some evidence that the level of HDL cholesterol is a better predictor of coronary heart disease than the concentration of apolipoprotein AI (Ishikawa, 1978). The results of this study clearly demonstrate that weight reduction is the cause of the increase in HDL cholesterol induced by physical activity. Thus, a positive correlation was observed between the changes in the body weight and HDL cholesterol concentration. The variable most strongly associated with the increase in HDL cholesterol in the exercise group was the decrease in serum triglycerides. A correlation has earlier been demonstrated in cross-sectional studies between serum triglyceride and HDL cholesterol levels (Sallinen et al., 2007; Sigal et al., 2007). Results of various research studies suggested that processes associated with weight change produce much of the plasma HDL-C changes induced by moderate exercise and that changes in HDL-C concentration predominantly reflect changes in the reputedly anti-atherogenic HDL2 sub-component. Further, the interaction between weight change and plasma HDL-C concentration was significantly different ($p<0.001$) in exercisers and controls suggesting that the metabolic consequences of exercise induced weight change are different from the consequences of weight change in the sedentary state. However, based on the results of this study, one can claim that physical exercise has effects on serum lipoproteins and middle aged people could practice regular moderate (aerobic) exercise. Further studies comprising different methodology are needed to clarify this issue.

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