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The Effect of Regular and Short-Time Exercise on Serum Lipids and Lipoproteins

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The effects of regular short-time exercise on serum lipids and lipoproteins were investigated. 24 university students (12 males, 12 females) between the ages of 19 and 22 years old were included in this study. Before and after exercise, consisting of basketball training three days a week (60 min per session), total cholesterol (TC), triglyceride (TG), low density lipoprotein-cholesterol (LDL-C), high density lipopprotein-cholesterol (HDL-C) levels were measured in the serum samples. For females, at the beginning and end of the 45 min exercises TC, TG, LDL-C, HDL-C values were measured respectively as 123.12 ± 38.03, 141.82 ± 49.32, 75.00 ± 36.51, 30.20 ± 8.20, 100.78 ± 23.50, 70.70 ± 15.00, 42.21 ± 16.06 and 33.47 ± 9.72 mg/dl. For males, these values were found respectively as 105.68 ± 40.08, 177.05 ± 57.72, 58.13 ± 27.86, 29.50 ± 11.97, 94.06 ± 24.30, 82.05 ± 33.11, 31.82 ± 22.34 and 30.75 ± 15.73 mg/dl. The results showed that there were no significant differences in the pre- and post-exercise between groups for any of the parameters tested, except TG values in female group and LDL-C values in male group. TG levels in girls group and LDL-C levels in boys group had a significant decrease. These results indicate that the regular and short-time exercise has no effect on serum lipid and lipoproteins.

Key Words: Short-time exercise, Regular exercise, Serum lipids, Serum lipoproteins.

INTRODUCTION

An inverse relation between physical activity, physical fitness and the incidence of coronary artery disease have been observed in many epidemiological studies. However, whether physical activity has a benefical effect on the lipid profile, which is an established cardiovascular risk factor, is still debated. Some studies and physical training experiments have been conducted to measure the effect of increased physical activity on serum lipoprotein concentration[1–11].

Exercise has major effects on lipid and lipoprotein metabolism which are a function of the duration, the intensity and the frequency of exercise. In different training and physical activity programs a decline in TC, TG, LDL-C levels, as well as a rise in HDL-C levels, have been demonstrated[12–15]. A limited number of studies have been performed exclusively to investigate the effect of the acute exercise on serum lipid and lipoprotein in women. Some studies conducted to

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examine the effect of regular physical activity/exercise program, a 100 km run or triathlon. Other studies examined the acute effects of moderate exercise. The present study was designed to examine the effect of regular and short-time exercise on serum lipids and lipoproteins in young males and females[16–24].

EXPERIMENTAL

The samples consisting of 24 healthy university students (12 males, 12 females) between the ages of 19 and 22 years old were examined. As a preliminary study, they were asked to complete a questionnaire related to clinical test. The items in the test included whether they use alcohol and cigarette or have any disease etc. The students were required not to eat anything for 12 h. Before and after 60 min exercise, blood samples were taken from the students. Serum was obtained from the blood samples and TC, TG, LDL-C , HDL-C levels were studied in serum samples. The cholesterol content of HDL-C and serum samples were determined enzymatically using commercially available assay kits by otoanalyzer (Sigma Diagnostic). The TG levels were measured also enzymatically by otoanalyzer. LDL-C values were calculated using the method of the Friedewald *et al.*[25] formula. HDL-C test was carried out as follows: The lipoproteins in blood were separated with phosphotungstic acid and magnesium chloride. It was incubated for 10 min at room temperature. Supernatant was taken after centrifuge for 15 min at 5000 rpm. Only HDL stayed in the supernatant due to the separation of LDL and VLDL. Cholesterol test was made with cholesterol oxidase method. All serum lipids and lipoproteins values were stated as mg/dl.

TABLE-1
PHYSICAL CHARACTERISTICS OF SUBJECTS

Variables	Males (n = 12)	Females (n = 12)
Age (yrs)	21.67 ± 1.98	21.32 ± 2.01
Weight (cm)	65.72 ± 4.83	55.23 ± 4.68
Height (kg)	173.24 ± 5.72	169.56 ± 4.86

RESULTS AND DISCUSSION

Table-2 shows the means and standard deviations of TC, TG, LDL-C, HDL-C values in the blood samples for 12 male and 12 female students. It can be seen that after exercise TC levels decreased for both groups and no significant changes have been observed in these values in both the groups. However, TC levels of males were higher than thaose of females. The TG values decreased for both groups. But the significant change was only for males. TG levels in females were higher than males. After exercise, LDL-C levels for females and males decreased. The decrease in LDL-C levels for females was significant, but this decrease was not significant for males. Although HDL-C values increased for both groups, there were no significant changes. The TC : HDLC ratio was not significant for both groups.

TABLE-2
CHANGES (MEANS, STANDARD DEVIATIONS) IN SERUM LIPID AND LIPOPROTEINS

Parameters	Males (n = 12)		Females (n = 12)	
	Pre	Post	Pre	Post
TC (mg/dl)	123.12 ± 38.03	100.78 ± 23.50	105.68 ± 40.08	94.06 ± 24.30
TG (mg/dl)	141.82 ± 49.32	70.70 ± 15.76*	177.05 ± 57.72	82.05 ± 33.11
LDLC (mg/dl)	75.00 ± 36.51	42.21 ± 16.06	58.13 ± 27.86	31.82 ± 22.34*
HDL-C	30.20 ± 08.20	33.47 ± 9.72	29.50 ± 11.97	30.75 ± 15.73
TC/HDL-C	4.06 ± 0.72	3.01 ± 0.33	3.58 ± 0.64	3.05 ± 0.69

*$P < 0.05$.

Table-2 shows that there was no significant relation between the lipid and lipoprotein parameters. In conclusion, all regular and short time exercises had no noticeable effect on lipid and lipoprotein values. Some studies have investigated the effect of long and short time different exercises, such as physical activities, maratohn training, aerobatics on serum lipid and lipoprotein levels[26–37].

Fujino *et al.*[36] investigated the effects of walking on serum lipids among middle-aged and elderly women. They observed no significant difference in TC levels or the ratio of TC to HDLC between individuals who walked and those who did not walk. Therefore, they suggest that walking exercise may not achieve any benefical effect on lipid profiles among middle-aged/elder Japanese.

Fergunson *et al.*[28] examined the effect of prolonged exercise on plasma lipid and lipoprotein concentration and to identify caloric-time points where changes occurred. They found decrease in TC, LDL-C and HDL-C after exercise.

Isler *et al.*[12] studied that the effects of step aerobics and aerobic dancing on serum lipids and lipoproteins and TC, TG, LDL-C, HDLC levels, and TC : HDL-C ratio determined prior to and after an 8 weeks training period. They found that 8 weeks of step aerobics and aerobic dancing training did not result in any significant changes in TG and LDL-C levels among the step aerobics, the aerobic dancing and the control group. However, results of their study indicated a significant decrease in TC levels of the step aerobics and the aerobics dancing group when compared with the control group. Although they found a significant increase in HDL-C levels and a significant decrease in TC : HDLC ratio of the step aerobic group. No significant changes in these parameters have been found in the aerobic dancing group.

Higuchi *et al.*[30] conducted two studies related to swimming exercises. In the first study, 12 swimming-trained postmenoposial women were taken. In swimmers, serum TC/ HDLC ratio and TC concentrations were similar to those in untrained. On the other hand in swimmers, LDLC levels were higher in comparasion to untrained women. In the second, the study was conducted to test the effect of an 8 year swimming program on Vo 2 max and serum lipid and lipoproteins concentrations of post-menopausal untrained women. They found that no changes occurred in concentrations of TC, TG, LDLC, HDLC.

Imamure *et al.*[16] examined the effects of moderate exercise on serum lipids,

lipoproteins and apolipoproteins in seventy young men under controlled conditions and showed that there were no significant changes between the pre- and post-exercise samples for any of the parameters tested before and after 30 or 60 min exercise.

Rowland *et al.*[33] studied the effect of 13 weeks of aerobic activities three days a week (25 min per session) on serum lipids and lipoproteins and indicated that there were no significant changes in TC, TG, LDLC, HDLC levels between the control and training periods.

Gaesser and Rich[9] studied the effect of 18 weeks of high and low intensity exercise training and found no significant changes in TC, TG, LDLC, HDLC, TC : HDLC levels.

Ferrauti *et al.*[37] examined the effect of 6 weeks of regular participation in 2 h of intensive tennis training in middle aged men and found a significant decrease in TC, TG levels and TC : HDL-C ratio. But no significant changes were observed in HDL-C and LDLC levels.

Whitehurst and Menedez[38] examined the effect of 8 weeks of walking produced on serum lipids and lipoproteins in middle aged wome and found significant changes in HDLC and TG levels with no change in TC and LDLC.

Conclusion

The aim of the study was to examine the effect of regular short-time exercise on serum lipids and lipoproteins. For this purpose, in subjects TC, TG, LDLC, HDLC levels and TC : HDLC ratio were determined pre- and post-exercise after 8 weeks of regular exercise five days a week (60 min per session). The result of the present study showed that there were no significant changes between the pre- and post-exercise samples tested before and after 60 min exercise. The present results do not show similarities with the results of some earlier studies. Most of the factors such as diet, age, cigarette, oral contraceptives may affect serum lipids and lipoproteins, because TC, TG, LDL-C levels are affected by unsaturated fats in diet[13-15]. Another, not significant changes for the group might be for small samples in the present study, and the exercise program duration of the present study is not longer than other studies.

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