The Effects Of Eight-Week Core Exercises On Blood Lipids In Females

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Abstract: This study was conducted in order to identify the effects of an eight-week core training on the blood lipids of sedentary young females studying at Harran University. The subjects consisted of young female university students who were not exercising regularly or following a special diet. The group followed a ninety-minute core exercise program three days a week for eight weeks. Before and after each training session, total cholesterol, LDL cholesterol, HDL cholesterol and triglyceride levels were measured. The pre-training values of the participants were observed as follows: Age average: 20.87 ±2.68, height average: 160.12±3.89 cm, weight average 67.98 ±6.04 kg, and BMI average 26.59±1.96. While, at the end of the research process, there were no significant changes in the values of Total cholesterol and LDL cholesterol, there was a significant decrease in Triglyceride levels and significant increase in HDL cholesterol levels (p<.05). As a result, it was observed that an eight-week core exercise program caused positive changes in the blood lipid values of sedentary females.

Key words: Females, Core Exercise, Blood Lipids.

INTRODUCTION

An inactive lifestyle can disrupt the energy balance, thereby causing obesity. Obesity is characterized by high fat and endomorph rates (Erkan, N., 1998). It has been noted that body weight beyond normal limits will cause various health problems and weaken the work capacity of a person (Carter, J.E.L., B.H. Heath, 1990). Inactive and sedentary individuals are more prone to a wide range of diseases, from the so-called ‘the disease of our era’, i.e. obesity, and cardiovascular diseases to others such as muscle weakness, postural deformations and diabetes (Cox, L.C., et al., 2009; Guo, S.S., et al., 1999; Zorba, E., 1999). Physical activity prevents and helps to cure the atherosclerotic risk factors such as high blood pressure, insulin resistance, glucose intolerance, high triglyceride concentration, low and high concentration of lipoprotein cholesterol concentration and obesity.

Exercise in low density along with loss weight can both lower lipoprotein cholesterol (LDL) concentrations and control the decrease in HDL (Stefanick, M.L., et al., 1998). Many studies in the field show that physical activity reduces the risk of cardiovascular diseases (Blair, S., et al., 1995; Blair, S., et al., 1989; Ekelund, L., et al., 1988; Katzmarzyk, P.T., et al., 2004; Mark, D., M. Lauer, 2003; Meyers, J., et al., 2002; Paffenbarger, R.J., et al., 1986; Paffenbarger, R.J., et al., 1993; Slattery, M., D.J. Jacobs, 1988) due to the positive effect of exercise on the lipid metabolism (Kraus, W., et al., 2002; Leon, A., O. Sanchez, 2001). It has also been found out that, because of its negative effects on serum lipoprotein concentrations, physical inactivity increases the cardiovascular risk factors (Leon, A.S., O.A. Sanchez, 2001; Leon, A.S., O. Sanchez, 2001; Pate, R.R., M. Pratt, S.N. Blair, et al. 1995). The conveniences of modern life have made people less and less active. Masses of people work sitting all day and watch TV for hours during the rest of their time (Zorba, E., S. Yildirim, O. Saygin, 2000).

It has been observed in recent years that especially young women have a strong and continuous desire to look good. Fitness, step-aerobic, swimming, and more commonly jogging have become a part of daily life in modern societies. The “core” region consists of abdominals, in other words, the lower and upper muscles in the abdomen: serratuses that are next to upper abdominal muscles, oblique that are next to the lower abdominal muscles and the muscle group that extend from the lower back to the neck that help our skeleton to have the right posture.

“Core exercises” refer to those exercises that work on the above mentioned abdomen and back regions. It is important to strengthen the core region not only for athletic stamina but also because of the fact that it corrects our posture. Core training improves the control and balance of the body, strengthens many small and large muscle groups, and because of the improved balance, transitions between body movements become more effective. Core exercises can be done solely by the weight of the body or with the aid of exercise equipment. There are hundreds of exercises that are designed for medicine balls, gym balls, stretch bandore merely the body’s own weight (William, E., 2010).

The core exercises for the abdominal and back region, the problematic areas for women in particular, makes it faster to reach fitness goals. Thanks to the strong core muscles emerging after these exercises, many physical activities can be done much easier.

This study examines the effects of an eight week core training program on the blood lipids of young female university students at the obesity threshold.

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MATERIALS AND METHODS

The Participants And Their Properties:
In order to identify the effects of an aerobic based eight-week core exercise program on the blood lipids of sedentary young women, this study recruited sixteen voluntary healthy subjects who were students at Harran University and whose ages ranged from 19 to 23. The subjects were chosen among non-smoking students who did not follow any training or diet plan. Also, they did not have any illnesses nor were they using any prescribed medicine. Measurements were taken twice based on pre-test and final test application model.

The average values of the subjects were as follows: 20,87 ±2,68 of age; 160,12±3,89 cm of height, 67,98 ±6,04 kg of weight and 26,59±1,96 kg/m² of BMI. A medical report allowing physical exercise was requested from each student. Additionally, a questionnaire of medical history was conducted. No special diet plan was given to the subjects; they were asked to carry on their usual diets.

The Training Program:
The subjects were put to practice sixty minutes a day, three days a week throughout eight weeks. They were coached to do 15-20 minutes of warm up exercises before the sessions and 5-10 minutes of stretching after. The density of the workouts was set to be 60% of the targeted heart rate with 6 to 8 sets. Static and dynamic core exercise methods were used. Workouts such as side bridge endurance test, flexor endurance test, sitting motionless on the pilates ball, side step chop, medicine ball standing twist, plank test and push up position plank were done. The intensity of the exercise and heart rate was determined based on the Karvonen reserve method (Fox, Bowers, Foss, 1990).

Measurements and Tests Used in the Study:
The body composition measurements were taken at the physiology laboratory of the School of Physical Education and Sports at Harran University, and blood lipid tests are done at the biochemistry laboratories of the Medicine School of the same university. All the measurements and tests are first applied to the subjects a week before the training program and then a week after that.

Measuring the Height and Weight:
The body weight of the subjects was taken in kilograms with a scale with 0.01 kg sensitivity. The subjects were bare feet, wearing sport tights and a t-shirt. The height measurements were taken in centimeters with a Holtain Ltd. Brand measurement instrument (sensitivity 0.01 cm). The following formulas were used to calculate the ideal Body Weight and BMI (Body Mass Index) respectively: (45.5 + 2.3 (Height- 60) and (Weight (kg) / Height(m)²). (Tamer, K., 2000).

Blood Lipid Measurement:
The blood tests were administered at the Biochemistry labs of the Harran University School of Medicine Research Hospital by the experts before and after the training sessions at 9:00-10:00 AM during the eight week process. The subjects were required to fast 12 hours before the tests. Blood samples were taken from the subjects for Total Cholesterol, HDL-cholesterol, LDL-cholesterol and triglyceride values.Total Cholesterol, Triglyceride, High Density Lipoprotein (HDL) and Low density Lipoprotein levels were measured by Abbott Architect c16000automatic analyzer.

Statistical Analysis:
The findings of pre and post training sessions of the eight-week program were stored in the digital medium instantly. Arithmetic mean and standard deviation of all data was calculated. Dependent T test was administered to find out whether there was a significant relationship between the pre and post test values and whether the results were at the 0.05 significance level(p< 0.05).

Findings:
Table 1 shows the statistical results of the age, pre-training height, weight and BMI measurements of the participants.

<table>
<thead>
<tr>
<th>Table 1: Anthropometric measurements of the subjects</th>
<th>N</th>
<th>Mean</th>
<th>Median</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE</td>
<td>16</td>
<td>20,8750</td>
<td>19,5000</td>
<td>2,68017</td>
</tr>
<tr>
<td>HEIGHT</td>
<td>16</td>
<td>1,6012</td>
<td>1,6100</td>
<td>3,89658</td>
</tr>
<tr>
<td>WEIGHT</td>
<td>16</td>
<td>67,9875</td>
<td>65,7500</td>
<td>6,04724</td>
</tr>
<tr>
<td>BMI</td>
<td>16</td>
<td>26,5938</td>
<td>25,9000</td>
<td>1,96179</td>
</tr>
</tbody>
</table>

As the Table 1 shows, the mean age of the subjects was 20,87 ±2,68, the mean height 160,12±3,89 cm, the mean weight 67,98 ±6,04 kg and BMI 26,59±1,96 kg/m2 (Table 1).
Table 2: Blood Lipid Values of the Study Group Before and After the Core Training Sessions

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>TG1</td>
<td>97,8469</td>
<td>16</td>
<td>43,0062</td>
<td>10,7517</td>
</tr>
<tr>
<td>TG2</td>
<td>76,3881</td>
<td>16</td>
<td>26,0663</td>
<td>6,51660</td>
</tr>
<tr>
<td>TK1</td>
<td>168,9744</td>
<td>16</td>
<td>34,9840</td>
<td>8,74601</td>
</tr>
<tr>
<td>TK2</td>
<td>153,9069</td>
<td>16</td>
<td>31,3615</td>
<td>7,84038</td>
</tr>
<tr>
<td>HDL-K1</td>
<td>50,9213</td>
<td>16</td>
<td>15,7149</td>
<td>3,92873</td>
</tr>
<tr>
<td>HDL-K2</td>
<td>52,2444</td>
<td>16</td>
<td>21,8829</td>
<td>5,47073</td>
</tr>
<tr>
<td>LDL-K1</td>
<td>104,1863</td>
<td>16</td>
<td>27,2405</td>
<td>6,81014</td>
</tr>
<tr>
<td>LDL-K2</td>
<td>89,3006</td>
<td>16</td>
<td>22,3921</td>
<td>5,59803</td>
</tr>
</tbody>
</table>

Table 2 shows the pre and post core exercise values of the participants’ levels of Triglyceride (TG), Total Cholesterol (TC), high density lipoprotein (HDL-C) and low density lipoprotein (LDL-C). When Table 2 is examined, it can be seen that before the eight week core exercises, the participants had high levels of Triglyceride (TG), Total Cholesterol (TC), low density lipoprotein (LDL-C) and low levels of high density lipoprotein (HDL-K).

Table 3 shows the Dependent T Test analysis of the participants’ pre and post eight-week core exercise values of Triglyceride (TG), Total Cholesterol (TC), high density lipoprotein (HDL-C) and low density lipoprotein (LDL-C). It can be seen from the findings in the Table 3 that there was not a meaningful relationship between the pre and post training TC and HDL cholesterol values (p>0.05), however, that there was a significant difference between the pre and post training LDL cholesterol and TG values (p<0.05).

Table 3: The Dependent T Test Results of the Pre and Post Training Blood Lipid Values of the Subjects

<table>
<thead>
<tr>
<th>Paired Differences</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>95% Confidence Interval of the Difference</th>
<th>t</th>
<th>Df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TG1&amp;TG2</td>
<td>21,45875</td>
<td>29,9576</td>
<td>7,48942</td>
<td>5,49544</td>
<td>37,42206</td>
<td>2.865</td>
<td>15</td>
</tr>
<tr>
<td>TK1 &amp; TK2</td>
<td>15,06750</td>
<td>31,31262</td>
<td>7,82816</td>
<td>-1,61782</td>
<td>31,75282</td>
<td>1.925</td>
<td>15</td>
</tr>
<tr>
<td>HDL-K1 &amp; HDL-K2</td>
<td>-1,32313</td>
<td>10,79070</td>
<td>2,69768</td>
<td>-7,03704</td>
<td>4,24683</td>
<td>-4.909</td>
<td>15</td>
</tr>
<tr>
<td>LDL-K1 &amp; LDL-K2</td>
<td>14,88563</td>
<td>26,34529</td>
<td>6,58632</td>
<td>.84721</td>
<td>28,92404</td>
<td>2.260</td>
<td>15</td>
</tr>
</tbody>
</table>

Discussion And Conclusion:

This study was done in order to identify the effects of an eight-week core training on the blood lipids of sedentary young females studying at Harran University. After the administration of the core training sessions, it was seen that there was a decrease in LDL cholesterol and TG levels. When compared with the findings in the literature, it was determined that the outcome of the study is compatible with the literature.

Weight loss programs reduce the risk of coronary artery disease in females. On the other hand, a sedentary lifestyle is the main cause the obesity disease that follows the process of a continuous increase in body weight. Several research findings report that regular and long term aerobic exercises in medium intensity decrease the body weight, body fat percentage and body mass index (Okyar, M., 1998; Ponje, G.A.E.P., et al., 1996). Sacakli et al. observed 16 obese females for a month of cycling exercise at the intensity of 60–70 % of their heartbeat, general and special gymnastic exercise and weight-lifting at the 20–40% of their maximal power. They found out that the pre-training fat percentage of 37.8 fell down to 33.27 after the training. This finding supports the results of our study (Sacakli, H., et al., 1997). When the BMI values of the 16 female participants are examined, it is seen that they are above their normal weight and close to obesity. It is noted in many studies that overweight individuals have a high risk of corroner heart disease (Blair, S., et al., 1995; Blair, S., et al., 1989; Ekelund, L., et al., 1988; Katzmarzyk, P.T., et al., 2004; Mark, D., M. Lauer, 2003; Slattery, M., D.J. Jacobs, 1988).

It is widely reported that physical activity can reduce the risk of heart diseases and cause positive changes in the antioxidant/pro-oxidant balance. Physical activity is also accepted to change the lipid and lipoprotein profiles (Hu, F.B., et al., 2001). Plasma lipid changes that occur after training sessions can be due to the changes in endogenous sex hormones or the loss of fat mass rather than the physical activity itself (Sacks, F.M., 2001). A related research indicates that exercise at an adequate frequency and intensity can lower triglyceride and LDL-cholesterol levels and increase HDL-cholesterol levels (Yanagibori, R., et al., 1993). The findings of the research are compatible with our study.

Another study that focuses on the impact of a 12-week exercise on the body composition and blood lipid values of young and middle-aged women states that exercise brings about positive changes in the body composition and an increase in the middle-aged women’s HDL cholesterol levels together with a decrease in their triglyceride values (Karacan, S., F.F. Çolakoğlu, 2003). In their study where they put their subjects to a 16
week aerobic exercises, Elosua R et al. found out that regular physical exercise increased the LDL oxidation resistance and lowered the oxidation in LDL concentration (Elosua, R., et al., 2003). Miller et. al. had overweight individuals go through a 9-week aerobic exercise and a hypertension preventing diet. At the end of the program, they observed a decrease in the experimental group’s body weight, total cholesterol, LDL and HDL cholesterols (Miller, E.R., et. al., 2002). In another study that consisted of 48 sedentary females, LeMura et.al focused on the effects of various exercises on lipoprotein and lipid profile, cardiovascular fitness and body composition for 16 weeks. 12 of the females went through aerobic exercises, 12 of them resistance exercises and 12 both aerobic and resistance while the remaining 12 acted as the control group. At the end of the program, only those who did the aerobic exercises had significantly low body fat percentage and triglyceride values and significantly high HDL cholesterol (LeMura, L.M., et. al., 2002). Iriet. al. report that walking exercises improve the aerobic capacity, and with the increasing amount of oxygen, certain blood parameters, body fat percentage and body mass index show statistically significant difference (İri R., A. Ersoy, R. İri, 2010).

Borehamet. al. had 12 sedentary females do stair-climbing workout for 7 weeks and observed at the end of the process an increase in their HDL cholesterol concentrations (Boreham, C.A., et. al., 2000). In another study, the relation between physical fitness/activity levels and blood lipids of black and white females and males between 18 and 30 was analyzed, and it was found out that the subjects with low physical fitness and activity levels had more body weight and less HDL cholesterol compared to those who had high fitness and activity (Sternfeld, B., et. al., 1999). Furukawa et. al. had middle-aged females go through a 12-week walking program and witnessed an increase at the HDL cholesterol levels of the experimental group and decrease at the control group’s (Furakawa, F., et. al., 2003). Leon et. al. notes that aerobic exercise plays an important role in the increase of HDL levels but not in the decrease of LDL values (Leon, A.S., O.A. Sanchez, 2001). Turgayet. al. found out that various workout programs at aerobic and anaerobic threshold pace had positive acute effects on triglyceride, LDL and HDL cholesterol levels (Turgay, F., et. al., 2002). Koç & Tamer, who aimed to identify the effects of aerobic and anaerobic workouts on body weight, body fat percentage, high density lipoprotein (HDL) and low density lipoprotein levels, concluded that aerobic and anaerobic workouts had positive effects on LDL and HDL cholesterol levels (Koç H., K. Tamer, 2008). Branth et. al. found out an increase in HDL levels and no change in LDL levels after their 6-week resistance program (Branth, S., et. al., 2006; PALA, R., et. al., 2012). Thomson et. al. indicates that a series of intense exercises cause LDL cholesterol levels to go down while increasing HDL cholesterol values (Thompson, P.D., et. al., 2004).

As a result, significant decrease in Triglyceride and LDL cholesterol levels was observed at the end of the 8-week core training. This outcome is probably the result of the fact that core trainings played out a similar effect on the participants’ serum lipid levels as anaerobic workouts and that LDLs entered into cells more quickly due to an increase in the LDL receptor activity. According to the related literature, aerobic training increases HDL cholesterol and decreases LDL cholesterol levels (Solak, H., et. al., 2002; Ghavam-Bakhtiar, R., et. al., 2012; Glass, J.N., et. al., 2002). It was found out in our study that core exercises put in good shape the core region, an area where overweight females especially complain about. Furthermore, these exercises also caused a significant decrease in the LDL cholesterol and Triglyceride levels (p<0.05).

Therefore, it is highly recommended for women, especially those leading an inactive life and struggling with excessive weight, take up regular core exercises to raise their life quality and stay in shape in middle age and later periods where organic depression speeds up.

**REFERENCE**


