ORIGINAL ARTICLE

The Effect of Exercise and The Consumption of Fish Oil On Serum Lipid and Enzyme Levels of Sedentary Females

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ABSTRACT

Introduction: In this study, contributions of both exercise and fish oil consumed as a dietary supplement by sedentary individuals, to some biochemical parameters are evaluated.

Material and methods: 40 females with LDL-Cholesterol levels over 130 mg/dL and total Cholesterol over 200 mg/dL participated in the study based on exercise and fish oil consumption. Levels of Total-Cholesterol, HDL and LDL-Cholesterol, triglyceride, ALT, AST, ALP, GGT, LDH, CPK and Amylase, weights, heights, blood pressures, and body mass index (BMI) were analyzed. The non-parametric Wilcoxon test on SPSS 15.0 statistics program for intragroup statistics and the Kruskal-Wallis test at the level of significance as p<0.05. for the differences of groups were used.

Results: According to the first and the last measurements, although different increases and decreases in the related enzymes and blood lipids in each group are detected, these changes are assessed as statistically non-significant (p>0.05).

Conclusions: Walking for 45 minutes 3 days a week for 30 days and the daily 720 mg. omega-3 fatty acid dietary supplements have no effect on LDL and total cholesterol levels for females with a sedentary life.

Keywords: Fish oil, exercise, enzyme level, blood pressure, BMI

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INTRODUCTION

A sedentary life leads to an increase in body weight and later the development of obesity as well as the deterioration of some biochemical parameters (such as dyslipidemia), which form a basis for cardiovascular diseases of obese patients and the development of cardiovascular diseases in further terms. Approximately, between 60% and 70% of obese patients are dyslipidemic. It is observed that there is an increase in their serum triglycerides and LDL-Cholesterol, whereas there is a decrease in their HDL cholesterol levels. Therefore, there is a higher risk for obese patients to develop cardiovascular disease [1]. Overweight or obese individuals aim to lose weight by utilizing food supplement products such as L-Carnitine apart from exercising or to prevent possible health problems resulting from being overweight by consuming food supplement products such as fish oil or to prohibit the already existing health issues. There are some studies showing that cardiovascular diseases (CVD) are less common in communities, where plenty of fish (rich in omega-3 fatty acids) are consumed. In a 30-year-study, conducted by Mozaffarian and Wu [2], it is proved that the risk of CVD relative is 0,62 and the non-rapid death related to myocardial infarction relative risk is 0,33 on men consuming fish when compared to men not consuming fish. In another comprehensive study, carried out by Hu *et al*. [3], 84.668 women were followed up for 16 years and it is determined that death related to coronary heart disease is less observed at a rate between 29% - 34% on women consuming fish once a week than women consuming fish once a month.

Sujeta *et al*. [4] conducted a study to show the effect of low dose omega-3 fatty acid supplement and 84 office workers, whose ages are between 40 and 60, participated in a placebo-controlled, open, randomized, parallel-group work lasting 16 weeks. Per day, 330 mg. omega-3 fatty acid and 0.005 mg. (200 IU) vitamin D3 was provided to the experimental group and a placebo was given to the control group. The values were measured in the 12th and 16th weeks. Body mass (BM) and body mass index (BMI) contains both experimental (BM 74.4 ± 13.04 to 73.2 ± 13.02 kg, $p < 0.001$; BMI 25.8 ± 4.1 to 25.4 ± 4.3 kg / m2, $p < 0.001$) and placebo groups (BM 69.5 ± 11. to 68.7 ± 11.4 kg, $p < 0.05$; BMI 24.1 ± 4.0 to 23.8 ± 4.2 kg / m2, $p < 0.05$). Omega-3 fatty acid supplement glucose is (5.12 ± 0.55 and 4.97 ± 0.62 mmol / l; $p = 0.05$) and total cholesterol is (5.86 ± 1.0 to 5.32 ± 1.55 mmol / l; $p = 0.003$).

While a daily supplement of 300 mg. omega-3 fat acids has a slightly positive effect on total cholesterol and glucose levels, it is observed that low dose has no effect on low and high-density lipoproteins and triglyceride levels.

Manson *et al*. [5] prove that the incidents related to CVD may be reduced by consuming fish and this effect is positively correlated with dose. It is determined in a study related to cardiac, which lasted for over 4 years, a diet rich in omega-3 may lead to a decrease at a rate of %47 in CVD, however, it has no impact on stroke6.

MATERIALS AND METHODS

This study is approved by Marmara University Medical Faculty Clinical Studies Ethics Committee (09.2016.483).

Procurance of Experimental Subjects

These subjects are selected among patient groups, who are at the age of 50-65, women and who have not begun any statin treatment, do not use any medicine effective on lipid profile, whose LDL-cholesterol levels are over 130 mg/dL and total cholesterol levels are over 200 mg/dL and who live in the same district in Istanbul and consult on the same Family Health Center. This study is planned as 4 subject groups, each consisting of 10 women.

The details of the grouping are stated below:

Group A (Exercising and taking fish oil supplement),

Group B (Exercising and not taking fish oil supplement),

Group C (Not exercising and taking fish oil supplement),

Group D (Not exercising and not taking fish oil supplement)

1. **Group A**: It consists of 10 women, who participate in a walking activity on Life Fitness F1 Smart 2,5 treadmill at a speed of 5,0 - 5,5 km/hour for 45 minutes per day and 3 days in a week and in addition, uses fish oil supplement every day at a rate of 720 mg. per day.

2. **Group B**: It consists of 10 women, who walk at a speed of 5,0 - 5,5 km/hour on the treadmill for 45 minutes 3 days a week and do not consume supplements such as fish oil, which affect their lipid profiles.

3. **Group C**: It consists of 10 women, who do not exercise apart from their weekly routine but use 720 mg. fish oil supplements every day.

4. **Group D**: It consists of 10 women, who do not exercise apart from their weekly routine and do not take supplements such as fish oil, which affect their lipid profiles.

The groups, taking Omega-3 supplement, used a commercial product (Marincap®), approved by the Ministry of Health, on a daily basis for 30 days, which contains 720 mg. omega-3 fat acid [380 mg Eicosapentaenoic acid (EPA)+200 mg Docosahexaenoic acid (DHA)]. The subjects did not use any medicine or dietary supplement, which may affect their lipid levels, and apply any special diet related to the study during this period.

On condition that they would be in the same way when the study started (on the first day) and it ended (on the last day), patients' blood pressures, weights and heights were measured after they rested for 5 minutes, and their BMI values were calculated.

Biochemical Analysis

After the first day and 30-day-period, on 31st day of the study, in 5 cc blood samples of the subjects, drawn by qualified personnel in the morning under sterile circumstances following the hungriness period for 8 and 10 hours, the levels of Total Cholesterol, HDL-Cholesterol, Triglyceride, Alanine Aminotransferase (ALT), Aspartate Aminotransferase (AST), Gamma Glutamyl Transferase (GGT), Lactate Dehydrogenase (LDH), Creatine Phosphokinase (CPK), Alkaline Phosphatase (ALP) and Amylase were analyzed by using Randox diagnostic kits in OlympusAu 600 autoanalysers (OlympusDiagnostica GMBH, Hamburg, Germany). The level of LDL-Cholesterol was calculated by using Friedewall formula [LDL-

Chol.= Total cholesterol-(triglyceride / 5 +HDL-Chol.)]

Statistical Analysis

In this study, the first and the last tests, which are True Experimental Design in Experimental Research Model, are used. The results of blood values, drawn from patients before and after the program, are evaluated by using a non-parametric Wilcoxon test in SPSS 15.0 statistics program on Windows on $p<0.05$ significance level and the differences between groups are evaluated by using Kruskal-Wallis test on $p<0.05$ significance level.

RESULTS

The changes in weight, BMI, and blood pressure values of subjects are shown in Figure 1A and Figure 1B.

Exercising and taking fish oil supplement group (Group A):

When the last and the first measurement values of subjects are compared; decrease in body weight ($p=0.111$), decrease in BMI values ($p=0.910$), decrease in systolic blood pressure values ($p=0.240$) and decrease in diastolic blood pressure values ($p=0.359$) are evaluated as statistically non-significant ($p>0.05$).

Exercising and not taking fish oil supplement group (Group B):

When the last and the first measurement values of subjects are compared; increase in body weights ($p=0.245$), increase in BMI values ($p=0.373$), decrease in systolic blood pressure values($p=0.411$) and decrease in diastolic blood pressure values ($p=0.359$) are evaluated as statistically non-significant($p>0.05$).

Not exercising and taking a fish oil supplement group (Group C):

When the last and the first measurement values of subjects are compared; while a decrease in body weights ($p=0.007$) and decrease in BMI values ($p=0.008$) are evaluated as statistically significant ($p<0.05$),

Parameters		Length (cm)	Weight (kg) First Measurement	Weight (kg) Last Measurement	BMI(kg/m^2) First Measurement	BMI(kg/m^2) Last Measurement	Age (year)
Groups		N: 10	N:10	N:10	N:10	N:10	N:10
Exercising and Using Fish oil (Group A)	Mean ± SD	157,3 ± 5,12	67,4 ± 3,1	66,20 ± 4,04	27,31 ± 2,04	26,81 ± 2,19	58,6 ± 5,99
	Range	150 - 165	63 - 73	60 - 72	23,1 - 29,5	23,9 - 30,3	50 - 70
	Asymp.Sig.		0,111		0,910		
Not exercising and Using Fish oil (Group B)	Mean± SD	158,3 ± 4,64	69,6 ± 5,13	70,50 ± 4,88	27,82 ± 2,55	28,17 ± 2,26	57,4 ± 5,46
	Range	153 - 167	62 - 78	64 - 78	24,8 - 32,9	25,6 - 32,9	48 - 65
	Asymp.Sig.		0,245		0,373		
Exercising and not using Fish oil (Group C)	Mean± SD	158,4 ± 5,68	69,9 ± 5,57	67,20 ± 5,26	27,86 ± 1,86	26,8 ± 1,95	56,8 ± 5,81
	Range	152 - 169	62 - 77	59 - 74	25,2 - 31,6	24,2 - 31,2	47 - 67
	Asymp.Sig.		0,007**		0,008**		
Not exercsing and not using fish oil (Group D)	Mean ± SD	162,1 ± 5,26	67,4 ± 4,62	68,50 ± 4,14	25,72 ± 2,14	26,11 ± 2,13	57,1 ± 8,89
	Range	153 - 169	60 - 76	63 - 77	22,9 - 29	23,8 - 29,5	43 - 68
	Asymp.Sig.		0,039**		0,073		

Figure 1A. Characteristic features of subjects

Groups \ Parameters		Systolic blood pressure (mm Hg) First measurement	Systolic blood pressure (mmHg) Last measurement	Diastolic blood pressure (mmHg) First Measurement	Diastolic blood pressure (mmHg) Last measurement
		N: 10	N:10	N:10	N:10
Exercising and Using Fish oil (Group A)	Mean± SD	125,8 ± 10,97	123,0 ± 8,18	78,4 ± 5,87	77,3 ± 3,83
	Range	105 - 142	109 - 136	71 - 86	72 - 83
	Asymp.Sig.	0,240		0,359	
Not exercising and Using Fish oil (Group B)	Mean± SD	122,2 ± 14,35	120,6 ± 10,16	80,9 ± 7,06	81,4 ± 6,08
	Range	96 – 141	102 – 136	67 – 89	69 – 91
	Asymp.Sig.	0,411		0,837	
Exercising and Not using Fish oil (Group C)	Mean ± SD	122,3 ± 11,5	123,2 ± 11,53	79,5 ± 7,04	81,3 ± 8,41
	Range	107 - 138	101 - 139	66 - 89	65 - 93
	Asymp.Sig.	0,683		0,152	
Not exercising and not using fish oil (Group D)	Mean ± SD	121,5 ± 17,12	120,5 ± 12,38	81,7 ± 7,63	71,9 ± 25,23
	Range	97 - 146	101 - 139	69 - 94	62 - 86
	Asymp.Sig.	0,573		0,590	

Figure 1B. Blood pressure values of subjects

Parameters / Groups		LDL-Choles. (mg/dL)	LDL Chol. (mg/dL)	Total Cholesterol (mg/dL)	Total Cholesterol (mg/dL)	HDL-Cholesterol (mg/dL)	HDL-Choles. (mg/dL)	Triglyserides (mg/dL)	Triglyserides (mg/dL)
		First Measurement	Last measurement	First Measurement	Last measurement	First Measurement	Last measurement	First Measurement	Last measurement
		N: 10	N:10	N:10	N:10	N:10	N:10	N:10	N:10
Exercising and Using Fish oil (Group A)	Mean± SD	183,76 ± 24,28	185,94 ± 36,82	266,5 ± 32,95	272,3 ± 34,2	60,0 ± 14,51	58,5 ± 9,51	128,3 ± 40,57	137,0 ± 49,96
	Range	139,2 - 232	143 - 258,8	224 - 331	234 - 337	45 - 86	47 - 73	83 - 199	89 - 235
	Asymp.Sig.	0.799		0.445		0,646		0,575	
Not exercising and Using Fish oil (Group B)	Mean ±SD	187,08 ± 33,56	174,86 ± 27,42	270,7 ± 36,69	263,5 ± 28,64	58,6 ± 10,63	58,3 ± 9,64	134,9 ± 61,55	141,8 ± 37,62
	Range	153,2 - 274	149,2 - 248	230 - 358	222 - 327	44 - 73	44 - 72	77 - 288	103 - 208
	Asymp.Sig.	0.087		0.152		0,100		0,838	
Exercising and Not using Fish oil (Group C)	Mean± SD	172,36 ± 21,25	163,8 ± 22,03	259,1 ± 28,67	260,5 ± 24,98	55,1 ± 10,89	56,3 ± 8,64	113,7 ± 31,03	134,4 ± 50,13
	Range	146,8 - 201,4	142,6 - 211,4	217 - 302	226 - 295	45 - 71	42 - 72	73 - 163	83 - 208
	Asymp.Sig.	0.284		0.759		0,385		0,332	
Not exercising and not using fish oil (Group D)	Mean± SD	173,72 ± 27,44	183,3 ± 33,9	264,9 ± 29,38	272,7± 32,53	55,5 ± 9,25	55,5 ± 9,44	161,9± 91,36	169,5 ± 97,67
	Range	111,2-212,2	109,8-226,4	223-315	210-328	43-66	40-68	66-337	61-359
	Asymp.Sig	0.202		0.184		0,838		0,799	

Figure 2. Lipids profiles of subjects

increase in systolic blood pressure values (p=0.683) and increase in diastolic blood pressure values(p=0.152) are evaluated as statistically non-significant (p>0.05).

Not exercising and not taking fish oil supplement group (Group D):

When the last and the first measurement values of subjects are compared; increase in body weights(p=0.039) are evaluated as statistically significant(p<0.05), increase in BMI values (p=0.073), decrease in systolic blood pressure values(p=0.573) and decrease in diastolic blood pressure values (p=0.590) are evaluated as statistically non-significant (p>0.05).

The transformation between the serum lipid levels of subjects is indicated in Figure 2:

Exercising and taking fish oil supplement group (Group A):

When the last and the first measurement values of subjects are compared; increase in total cholesterol levels(p=0.445), decrease in HDL-Cholesterol levels (p=0.646), increase in LDL-Cholesterol levels (p=0.799), increase in Triglyceride levels (p=0.575) are evaluated as statistically non-significant(p>0.05).

Exercising and not taking fish oil supplement group (Group B):

When the last and the first measurement values of subjects are compared; decrease in total cholesterol levels (p=0.152), decrease in HDL-Cholesterol levels (p=0.100), decrease in LDL-Cholesterol levels (p=0.087), increase in Triglyceride levels (p=0.838) are evaluated as statistically non-significant (p>0.05).

Not exercising and taking a fish oil supplement group (Group C):

When the last and the first measurement values of subjects are compared; an increase in total cholesterol levels (p=0.759), increase in HDL-Cholesterol levels(p=0.385), decrease in LDL-Cholesterol levels (p=0.284), increase in Triglyceride levels (p=0.332) are evaluated as statistically non-significant(p>0.05).

Not exercising and not taking fish oil supplement group (Group D):

When the last and the first measurement values of subjects are compared; while increase in total cholesterol levels (p=0.184), increase in LDL-Cholesterol levels (p=0.202), increase in Triglyceride levels(p=0.799) are evaluated as statistically non-significant(p>0.05), no difference is observed in HDL-Cholesterol levels.

The transformation of serum enzyme levels of subjects is demonstrated in Figure 3 and Figure 4.

Parameters / Groups		ALP (U/L) First Measurement	ALP (U/L) Last measurement	ALT (U/L) First Measurement	ALT(U/L) Last measurement	AST(U/L) First Measurement	AST(U/L) Last measurement	GGT(U/L) First Measurement	GGT(U/L) Last measurement
		N:10	N:10	N:10	N:10	N:10	N:10	N:10	N:10
Exercising and Using Fish oil (Group A)	Mean ± SD	75,4 ± 20,57	77,1 ± 18,69	17,6 ± 3,78	17,8 ± 4,39	19,8 ± 3,52	20,3 ± 2,41	16,65 ± 3,39	18,41 ± 3,85
	Range	38 – 109	53 – 106	12-23	11-27	15 - 28	17 - 24	11,9 - 23	14,2 - 26
	Asymp.Sig.	0,722		0,877		0,438		0,066	
Not exercising and Using Fish oil (Group B)	Mean ± SD	73,1 ± 18,95	73,6 ± 16,81	17,5 ± 4,55	16,8 ± 4,29	20,3 ± 2,58	20,3 ± 3,53	16,87 ± 6,77	17,22 ± 8,03
	Range	38 - 96	53 – 104	11-26	12-27	16 - 25	16 - 26	9-27	9,3 - 28
	Asymp.Sig.	0,683		0,682		0,752		0,213	
Exercising and Not using Fish oil (Group C)	Mean ± SD	61,9 ± 21,47	68,1 ± 19,95	17,3 ± 5,54	17,4 ± 6,38	17,4 ± 3,66	19,0 ± 3,89	18,17 ± 7,23	19,18 ± 4,7
	Range	38 - 99	45 -109	10-26	10-27	12-22	13 - 23	10,7 - 34,5	11,4 - 27
	Asymp.Sig.	0,066		0,811		0,054		0,575	
Not exercising and not using fish oil (Group D)	Mean ± SD	73,9 ± 17,34	75,0 ± 13,09	21,6 ± 8,97	18,4 ± 6,48	21,1 ± 6,66	19,8 ± 3,88	21,13 ± 12,6	18,63 ± 6,71
	Range	46 - 93	49 - 96	10-39	10-31	14 - 35	14 - 25	12-55	11,7 - 33
	Asymp.Sig.	0,919		0,090		0,476		0,026**	

**p<0.05

Figure 3. ALP, ALT, AST and GGT levels of Subjects

Parameters / Groups		LDH(U/L) First Measurement	LDH(U/L) Last measurement	Amylse (U/L) First Measurement	Amylase (U/L) Last measurement	CPK U/L First Measurement	CPK U/L Last measurement
		N:10	N:10	N:10	N:10	N:10	N:10
Exercising and Using Fish oil (Group A)	Mean ± SD	159,7 ± 14,1	163,6 ± 14,71	71,2 ± 10,53	73,3 ± 11,99	70,4 ± 13,96	73,3 ± 12,49
	Range	142 - 190	146 - 187	51 - 89	46 - 89	52 - 96	55 - 101
	Asymp.Sig.	0,240		0,331		0,241	
Not exercising and Using Fish oil (Group B)	Mean ± SD	158,7 ± 18,47	165,5 ± 19,72	61,4 ± 7,9	63,1 ± 6,62	69,5 ± 18,55	74,7 ± 25,35
	Range	126 - 186	136 - 183	51 - 75	53 - 74	42 - 100	36 - 112
	Asymp.Sig.	0,056		0,283		0,261	
Exercising and Not using Fish oil (Group C)	Mean ± SD	160,0 ± 13,14	182,5 ± 17,48	57,8 ± 9,65	61,9 ± 9,47	69,5 ± 19,36	73,5 ± 25,39
	Range	139 - 182	153 - 202	44 - 72	47 - 74	46 - 99	51 - 109
	Asymp.Sig.	0,059		0,054		0,241	
Not exercising and not using fish oil (Group D)	Mean ± SD	159,2 ± 24,62	165,1 ± 20,87	64 ,0 ± 11,28	63,2 ± 7,7	76,8 ± 28,69	76,9 ± 20,12
	Range	123 - 199	136 - 192	46 - 82	47 - 74	34 - 113	46 - 107
	Asymp.Sig.	0,359		0,593		0,760	

Figure 4. LDH, Amylase and CPK levels of Subjects

Exercising and taking fish oil supplement group (Group A):

When the last and the first measurement values of subjects are compared; increase in serum ALT levels (p=0.877), increase in AST levels (p=0.438), increase in GGT levels (p=0.066), increase in LDH levels (p=0.240), increase in CPK levels (p=0.241), increase in ALP levels (p=0.722) and increase in Amylaselevels (p=0.331) are evaluated as statistically non-significant (p>0.05).

Exercising and not taking fish oil supplement group (Group B):

When the last and the first measurement values of subjects are compared; decrease in serum ALT levels (p=0.682), increase in AST levels (p=0.752), increase in GGT levels (p=0.213), increase in LDH levels (p=0.056), increase in CPK levels (p=0.261), increase in ALP levels (p=0.683) and increase in Amylase levels (p=0.283) are evaluated as statistically non-significant (p>0.05).

Not exercising and taking a fish oil supplement group (Group C):

When the last and the first measurement values of subjects are compared; increase in serum ALT levels (p=0.811), increase in AST levels (p=0.054), increase in GGT levels (p=0.575), increase in LDH levels (p=0.059), increase in CPK levels (p=0.241), increase in ALP levels (p=0.066) and increase in Amylase levels (p=0.054) are evaluated as statistically non significant(p>0.05).

Not exercising and not taking fish oil supplement group (Group D):

When the last and the first measurement values of subjects are compared; while decrease in serum ALT levels (p=0.090), decrease in AST levels (p=0.476), increase in LDH levels (p=0.359), increase in ALP levels (p=0.919) and increase in Amylase levels (p=0.593) are evaluated as statistically non-significant (p>0.05) and decrease in GGT levels (p=0.026) are evaluated as statistically significant (p<0.05), there is no difference in CPK levels.

DISCUSSION

Various studies related to sports show that exercises made with accurate density, appropriate time, and periods on provide largely useful contributions in terms of both psychological and physiological effects on individuals.

In a study on 32 hypertensive mice for 4 weeks by Howard *et al*. [7], mice were separated into 2 groups and while one group took 50 ml of fish oil as a dietary supplement, the other group did not consume any fish oil. In consequence of this study, in the group, which took the supplement for 4 weeks, there is a statistically significant decrease in the average of systolic tension at a rate of 6,5 mm Hg (p<0.03) when compared to the control group, there is a statistically significant decrease in the average of diastolic tension at a rate of 4,4 mm Hg (p<0.015).

Johanna *et al*. [8] conducted a study on 90 men hypertensive patients, whose ages are over 45 and tension values are over 140/90 mm Hg, and fish oil was provided at a rate of 3,7 g/day for 45 patients, whereas the other 45 patients, who were in the control group, had no supplement. After a 60-day-study, it was reported that in the values of patients, who used fish oil, there was a decrease at a rate of 1.5 mmHg in systolic tension and a decrease at a rate of 1.6 mmHg in diastolic tension (p<0.05).

In a study on 50 men subjects, whose ages are between 35 and 45, carried out by Şekeroğlu *et al*. [9], it is reported that mild running exercises for 15-20 minutes per day in 5 weeks increases lipoprotein lipase activity and exercising for 5 weeks provides positive effects on lipid metabolism and a decrease in LDL and HDL, and as a result, leads to the positive results in dyslipidemia.

Ortega *et al*. [10] conducted a study on randomized 38 subjects with metabolic syndrome for 24 weeks and half of the group consumed a placebo, whereas the other half took omega 3 fat acids (7,5 gram) supplement and exercised on the treadmill in a speed of 5 km/hour and 30 minutes/day on a daily basis and 5 days in a week. As the result of the study, although there is a decrease at a rate of 7,1% in their blood pressure average and a thinning around the waist at a rate of 1,8%, there is no significant difference between groups. In addition, there is a significant increase in HDL at a rate of 32% and there is no increase observed in their glycose measurements and fibrinogen values. Besides, there is p<0,05 statistical significance in tension, HDL ve BMI values between the control group and the group, consuming supplementary products.

Chan *et al*. [11] also performed a study, which includes 4 groups, each consisting of 10 persons and one group took 20 mg/day atorvastatin, one group took 2.4 mg/day fish oil, one group took fish oil and atorvastatin in the same rate and the last group took 4 gram/day maize oil. Fish oil and lipid regulator medicine are compared, and it is observed that atorvastatin in, used as a lipid regulator medicine, contributes to the increase of high LDL as well as HDL and may be beneficial for dyslipidemic diseases. In addition, omega-3 fat acid, provided as an alternative product with light side effects, produces a similar effect with lipid regulator medicine.

In a study of Ciubotaru *et al*. [12] separated 30 healthy individuals, consuming HRT, into randomized three groups and provided 14 gr/day safflower oil (SO), 7 gr/day both of safflower oil and fish oil (LFO) or 14 gr/day fish oil (HFO) for them for 5 weeks and as a result, it is found out with the assessments that the rate of plasma triacylglycerol (TG) and TG/HDL-C and serum high-sensitivity CRP is lower in the group, consuming fish oil when compared to the other groups. These results show that after a diet, fish oil may reduce the risk of cardiovascular disease of healthy post-menopausal women by means of the modulation both of plasma lipids and inflammatory indicators.

Valova *et al*. [13] separated 20 piglets, of which average weights are 25.98±3.67 kg into two groups and for 29 days, provided additional 2.5% fish oil as well as their standard daily nutrition for one group and did not provide fish oil for the other group, which was the control group. They compared the values of ALT, ALP, AST, BUN, uric acid, creatinine, total cholesterol, LDL, and HDL between these two groups. In this study, at the end of 29 days, there was a significant increase in the enzymes AST and ALP enzymes ($p<0.05$) of the first group, consuming 2,5% fish oil supplement, whereas there was no change in BUN, uric acid, creatinine and ALT ($p>0.05$). Besides this, in the first group, the levels of total cholesterol, LDL, urea, there was a significant decrease ($p<0.05$), while there was a significant increase in HDL level ($p<0.05$).

Nişancı *et al*. [14] conducted a study with 20 overweight women, separated into 2 groups (control and subject groups) and the subject group consumed 1000 mg. fish oil supplement per day in addition to their slimming diets, whereas they did not add a fish oil supplement to the slimming diet of the control group. At the end of 12 weeks, they reported that there was no important change in the levels of AST, GGT, HDL-K, LDL-K, triglyceride of the subject group, while there was a decrease in total cholesterol and ALT values, and the increase in ALP level was statistically significant. They also reported that there were no statistically significant differences in AST, ALT, GGT, total cholesterol, LDL-cholesterol, triglyceride, and BMI values between the subject and control group at the end of 12th group.

In our study, between the groups, each consisting of 10 individuals, there is no statistically significant difference between AST, ALT, GGT, LDH, total cholesterol, LDL-Cholesterol, and Triglyceride levels ($p>0.05$).

Apart from this, the decrease in BMI values of the group, exercising and not consuming fish oil, is assessed as statistically significant ($p<0.05$).

In a study, where 99 women, whose ages vary between 55 and 70, are assessed as a retrospective, LDH activities of obese women are significantly high when compared to the values of the control group and the GGT activities of overweight and obese women are significantly high when compared to the control group [15].

The effect of exercise on serum and biochemical parameters in the urine shows an alteration depending on the duration and severity of the exercise. Physical exercises, including the different types of muscular contraction, causes injuries in skeletal muscle. This injury has some symptoms such as muscle pain, CK, LDH, increase of muscle proteins in blood circulation like myoglobin. Even short-time walking may lead to an increase in plasma levels of these enzymes, generally, the impacts of heavy exercise occur more intense than mild exercises. In our study, the increase of serum enzyme levels between the group, exercising and consuming fish oil, and the group, exercising and not consuming fish oil, is assessed as statistically non-significant. In literature, there are studies analyzing the effect of exercise on enzymes' levels on serum and urine. Ayça *et al*. [16] stated in their study with taekwondo athletes that short-time but high-intensity exercise does not increase serum GGT levels, however, it causes a significant increase in urine GGT levels.

In addition, Ayça *et al*. [17], indicated in a study both with female and male volleyball players that the increase in urine GGT levels after an exercise is statistically non-significant.

In our study, we aimed that a product, which provides the regulation of dyslipidemia such as omega-3 fatty acid in a short term like 30 days for individuals, who do not have especially ideal lipid profile and have a sedentary life, and in addition to this, aerobic exercise, supporting fat burning, showed beneficial results in a very short time. However, the results we got showed that walking exercise for 45 minutes 3 days a week for 30 days and the usage of 720 mg omega-3 fatty acid dietary supplements on a daily basis have no effect on LDL and total cholesterol levels. We think that the next studies may bring a helpful result for sports and health sciences when longer exercise and higher doses of fish oil supplements are applied on a similar patient profile.

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