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The Effect of Physical Activity on Serum Lipid Metabolism in Obese Children

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Abstract: The aim of this study was to investigate the effect of exercise program applied to obese children on serum lipid metabolism. The study included 40 boys, between the ages of 13-15, divided into two groups: one an obese group consisting of 20 boys, and the other, an overweight group also consisting of 20 boys. The children who participated in the study were included in a three-day-a-week program for 8 weeks. Body mass index (BMI) was used to determine obesity in the formation of groups. The children who participated in the study were given sporting games and duration of walking program which were chosen according to the branches which lasted 60 minutes in 3 days, 3 days a week. In the plasma blood samples taken at the beginning and at the end of the study, direct LDL, VLDL, Triglyceride, HDL, LDL and Cholesterol levels were determined. SPSS 22.0 statistics software (SPSS Inc., Chicago, Illinois, USA) was used in the statistical analysis of data obtained in the study. The Independent Samples T test was used to compare the two groups, and the Paired Samples T test was used to analyze the difference between the pre and post-tests of the groups. In the analysis of the measured values of the obese subjects between the pre-test and the post-test, the body weight, direct LDL, triglyceride, HDL and cholesterol levels were found to be significant in favor of the last test ($p<0.05$); body weight, BMI, Direct LDL, VLDL, triglyceride, HDL and cholesterol levels of the overweight group were found to be significant in favor of the last test. ($p<0.05$). There was no significant difference between the pre-post test differences of the measured characteristics of both groups. ($p>0.05$). As a result, it can be said that 8 weeks of sportive game program applied to obese and overweight children between 13-15 years of age caused a positive change in serum lipid metabolism.
Keywords: Physical Activity, Lipid Metabolism, Cholesterol.

INTRODUCTION

The concept of obesity is simply defined as the consequence of the excess energy used. Genetic structure, conditions affecting energy metabolism, eating habits and obesity resulting from the complex interaction of socio-cultural factors; hypertension, cardiovascular disease, diabetes, degenerative arthritis, thrombophlebitis is a complex condition with close relationship with many diseases. It is considered as a disease that concerns all age and socio-economic groups with extremely serious social and psychological effects [1,2]. Obesity, which is a health problem with epidemic features all over the world, also affects the child age group [3]. Obesity is associated with many diseases in the short and long term and it is known that the onset of obesity extends to childhood [4]. Physical inactivity is the most important reason for the development of obesity. Conducting jobs with less energy in modern societies, especially spending more time in front of television in the childhood causes the body to accumulate this energy, which it can not use. As the human organism remains stationary, its physical activity capacity is reduced and it loses its fitnessThe muscles weaken and the functioning of the joints decreases and the energy resources are not consumed sufficiently [5-7]. Physical activity is an important function of living systems. It affects many systems and may also affect biochemical parameters. It is also known that biochemical levels vary depending on the type, severity and duration of the exercise [8]. Based on this information, it is thought that sportive games will affect lipid metabolism in obese and overweight children.

MATERIALS AND METHODS

Selection of Subjects

The study included 40 boys, between the ages of 13-15, divided into two groups: one an obese group consisting of 20 boys, and the other, an overweight group also consisting of 20 boys. In order to determine obesity and to form the groups, Body Mass Index (BMI), which is calculated by dividing the individual's body weight (kg) by the square of his height (m) (BMI=kg/m2), was used. The subjects participating in the study were informed about the physical activity program and the laboratory tests that would be performed. Informed consent forms and written confirmation for participation in the study were

obtained from the parents of the children that were included in the study.

Experimental Design

The children who participated in the study were included in a three-day-a-week program for 8 weeks. This consisted of 60 minutes of selected active sports and games and a walk that gradually increased in duration. The children's body weight and BMI were determined, and their LDL, VLDL, Triglyceride, HDL, LDL and Cholesterol levels were obtained from fasting blood samples collected while resting in the morning, one day before and one day after the 8-week exercise program.

Procedure

Physical Activity Program

The children who participated in the study were included in a three-day-a-week program for 8 weeks. This consisted of 60 minutes of selected sports games and a walk that gradually increased in duration. The physical activity program was prepared by considering the age and condition of children to achieve a heart rate during vigorous activity of between120-140 [9].

	1.day	2.day	3.day
1.week	30 min. walk	45 min. walk	60 min. walk
2.week	30 min. walk	45 min. walk	60 min. walk
3.week	15 min. warming/ 15 dk basketball	15 min. warming/ 20 dk basketball	15 min. warming/ 25 dk basketball
4.week	15 min. warming/ 15 dk basketball	15 min. warming/ 20 dk basketball	15 min. warming/ 25 dk basketball
5.week	15 min. warming/ 30 dk football	15 min. warming/ 5 dk football	15 min. warming/ 60 dk football
6.week	15 min. warming/ 30 dk football	15 min. warming/ 5 dk football	15 min. warming/ 60 dk football
7.week	45 min. walk	60 min. walk	75 min. walk
8.week	45 min. walk	60 min. walk	75 min. walk

Blood Testing Procedure

Venous fasting blood samples from the right arm were obtained from the children that participated in the study between 9:00-10:30 am at the Central Laboratory of the pediatric hospital, one day before and one day after the four-week physical activity program. The collected blood samples were centrifuged for seven minutes at 4000 rpm in a Nüve-NF800 device to separate the serum. LDL, VLDL, Triglyceride, HDL, LDL and Cholesterol levels were tested in serum.

Statistical Analysis

Statistical analysis of the data obtained in the study was performed using SPSS package program SPSS 22.0 statistics software (SPSS Inc., Chicago, Illinois, USA). The Independent Samples T test was used to compare the two groups and the Paired Samples T test was used to analyze the difference between the pre-tests and post-tests of the groups.

Table-1: Analysis of the values measured in obese subjects (n=20) between pre and post-tests

		Mean	Std. Dv.	t	p
Weight	Pre-test	79,4750	9,63612	8,216	0,001
	Post-test	76,5583	8,99338		
BMI	Pre-test	28,7583	2,14707	1,325	0,212
	Post-test	27,8500	3,15436		
Direct LDL	Pre-test	107,8333	24,41994	2,383	0,041
	Post-test	92,9167	9,15978		
VLDL	Pre-test	25,8333	18,87679	-1,134	0,281
	Post-test	31,1667	12,43772		
Triglyceride	Pre-test	159,2500	63,10759	2,895	0,015
	Post-test	111,4167	18,54458		
HDL	Pre-test	50,0833	10,62123	6,083	0,001
	Post-test	33,5000	7,47724		
LDL	Pre-test	91,3333	29,05272	0,209	0,838
	Post-test	89,7500	10,54967		
Cholesterol	Pre-test	159,0833	22,76544	4,619	0,001
	Post-test	133,6667	23,04278		

RESULTS

The statistical analysis of the pre-test and post-test values of the obese and overweight groups is provided in the tables.

When the pretest and posttest values of obese subjects were examined, body weight, direct LDL, Triglyceride, HDL and Cholesterol levels were statistically significant (p<0,05). No statistical significance was found in other parameters (p>0,05).

Table-2: Analysis of the values measured in overweight subjects (n=20) between pre and post-tests

		Mean	Std. Dv.	t	p
Weight	Pre-test	69,90	4,851	9,771	0,001
	Post-test	66,81	4,618		
BMI	Pre-test	26,36	,2443	8,810	0,001
	Post-test	25,22	,4345		
Direct LDL	Pre-test	114,8	28,80	4,343	0,001
	Post-test	91,60	24,74		
VLDL	Pre-test	34.00	14,54	-2,341	0,035
	Post-test	24,93	11,51		
Triglyceride	Pre-test	150,3	44,47	3,255	0,006
	Post-test	116,1	26,81		
HDL	Pre-test	49,33	13,62	7,165	0,001
	Post-test	36,86	10,39		
LDL	Pre-test	94,93	22,62	0,856	0,406
	Post-test	90,93	25,40		
Cholesterol	Pre-test	169,7	35,34	7,975	0,001
	Post-test	148,9	30,11		

When the values of the control group were evaluated, body weight, BMI, Direct LDL, VLDL, Triglyceride, HDL and Cholesterol levels were statistically significant (p<0,05). Not only was the LDL value of the overweight group found. (p>0,05).

Table-3: Intergroup analysis of pre-post test differences of measured values in obese and overweight subjects

		Mean	Std. Dv.	t	p
Weight	Obese	-3,091	1,0535	0,004	0,997
	Overweight	-3,093	1,226		
BMI	Obese	-1,500	1,023	-1,199	0,242
	Overweight	-1,140	0,501		
Direct LDL	Obese	-14,91	24,81	0,953	0,350
	Overweight	-23,26	20,74		
VLDL	Obese	5,333	16,28	-0,619	0,542
	Overweight	9,066	14,99		
Triglyceride	Obese	-47,83	57,24	-0,723	0,476
	Overweight	-34,20	40,68		
HDL	Obese	-16,58	9,443	-1,322	0,198
	Overweight	-12,46	6,738		
LDL	Obese	-1,583	26,25	0,283	0,780
	Overweight	-4,000	18,09		
Cholesterol	Obese	-25,41	19,06	-0,809	0,426
	Overweight	-20,80	10,10		

No statistical significance was found in the analysis of differences between obese and overweight groups (p>0,05).

CONCLUSION AND DISCUSSION

In this study; the aim of this study was to investigate the effects of 8-week physical activity on direct LDL (Low Density Lipoprotein), VLDL (Very Low Density Lipoprotein), Triglyceride, HDL (High Density Lipoprotein) and Cholesterol levels in obese and overweight boys. Age, gender, genetic predisposition, nutrition, nutrition knowledge and habits, psychological factors, home-based and sedentary lifestyles provide the basis for the development of obesity in children. In adolescents, there is an increase in fat mass in muscle growth in both sexes in men [10]. Obesity is known to be a risk factor for cardiovascular diseases. Insulin resistance, diabetes, dyslipidemia and

atherosclerotic diseases are more common in obese patients than non-obese patients [11,12]. Physical, physiological, psychological and motoric features of individuals who exercise are said to be positively affected and developed [13]. Exercise creates stress in the human organism, this stress also creates a variety of physiological and metabolic effects in the human body. One of these effects is changes in the blood. Generally, exercise has positive effects on lipid metabolism [14].

In our study, statistically significant differences were found in body weight, direct LDL, triglyceride, HDL and cholesterol levels of the obese group after exercise. Body weight, BMI, direct LDL, VLDL, HDL, Triglyceride and cholesterol levels of the overweight group were found to be significant ($p<0,05$). We can say that the weight ratio is lower in the weight metabolism of the overweight group and it can respond better to the stress caused by the exercise. Various stress conditions such as exercise and intensive training affect the release of hormones, causing increases and decreases in the levels of hormones. It is known that the concentration of blood lipid in the training person decreases. It is stated that these effects are caused by the harmony of endocrine functions [15].

When the studies on lipid metabolism were examined; It is reported that triglyceride levels are low compared to sedentary workers in different types of exercise, and triglycerides and cholesterol levels decrease after acute exercises. Studies have shown that people who exercise regularly have lower cholesterol and triglyceride values than those who do not. It has been shown that exercise has a positive effect on lipid and carbohydrate metabolism, decreases in body weight, fat stores, total cholesterol and triglycerides, and it has been shown that these changes may have significant effects on cardiovascular risk. In addition, the decrease in total cholesterol with exercise has been reported to be more [16].

As a result; It can be said that eight-week physical exercises cause changes in lipid metabolism in obese and overweight males, as well as physical, physiological and psychological characteristics of individuals who exercise.

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