European Journal of Physical Education and Sport Science
ISSN: 2501 - 1235
ISSN-L: 2501 - 1235
Available on-line at: www.oapub.org/edu

doi: 10.5281/zenodo.893277 Volume 3 | Issue 11 | 2017

THE EFFECT OF 4-WEEKLY LOW INTENSITY PHYSICAL ACTIVITY PROGRAM IN THYROID HORMONE LEVELS IN OBESE AND OVERWEIGHT CHILDREN

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Abstract:
The aim of this study is to examine the effect of 4 weeks of low intensity physical activity program on thyroid hormone levels in obese and overweight boys. A total of 27 boys in the 12-14 age range; obese group 12 and overweight group 15 were divided into two groups. Children who participated in the study during the 4 weeks 3 days a week, games and sporting selected time period of 60 minutes a day walking program applied increasingly. TSH, T3 and T4 levels were determined in blood samples taken at rest 1 day before and one day after the 4 week training program. In the statistical analysis of the data obtained in the study, SPSS package program SPSS 22.0 statistical program (SPSS Inc., Chicago, Illinois, ABD) was used. Paired Samples T tests were used to analyze the difference between the Independent Samples T and the pre-test and post-test of the groups in the comparison of the binary groups. At the end of the study, body weight and T3 values of obese subjects (n = 12) and body weight, BMI and T3 values of overweight group were found to be significantly different between pre-test and post-test ($p < 0.05$). In the analysis of pre-test and post-test differences of measured characteristics of obese and overweight subjects, no significant difference was found ($p > 0,05$). As a result; of obese and overweight boys in the 12-14 age range in the 4-week low intensity physical activity program it can be said to cause changes in thyroid hormone levels.

Keywords: obesity, thyroid hormone, physical activity

1. Introduction

Although the concept of obesity is simply defined as the result of excess energy compared to the energy consumed, 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. It is regarded as a disease which deals with all age and socio-economic groups with extremely serious social and psychological effects (1,2).

Obesity, an epidemic health problem all over the world, also affects the pediatric age group (3). It is well known that obesity is linked to many diseases in the short and long term, and that in the majority of adult obesity, this condition extends to the childhood of the onset of the condition (4). In recent years, the relationship between obesity and thyroid function tests has attracted attention, along with an increase in the number of obese children referred to clinics for medical treatment.

TSH is an important pituitary hormone that regulates thyroid gland functions, and TSH levels are a reliable index of biological activity of thyroid hormone (5). Because thyroid hormones regulate many metabolic systems related to rest energy consumption, thyroid disease it is not surprising that body weight, thermogenesis and lipolysis changes in fat tissue occur. Thyroid pathologies are also a growing endocrine problem and are often accompanied by obesity and other endocrine problems (6). In this study; The aim of this study was to investigate the effect of 4 week low intensity physical activity program on thyroid hormone levels in obese and overweight boys.

2. Materials and methods

2.1. Experimental approach to the problem

Children who participated in the training were given 3 hours a week for 60 days a week for 4 weeks, followed by an increasing number of sporting games and a long program of walking. TSH, T3 and T4 levels were determined in body weight, BMI and blood samples taken at rest in the morning before 1 day and one day after the 4 week training program. No changes in eating habits were made.

2.2. Subjects

A total of 27 boys in the 12-14 age range; obese group 12 and overweight group 15 were divided into two groups. Subjects were informed about physical activity schedule and laboratory tests to be performed. Ethical approvalwas obtained from Gaziantep Clinical

Research Ethical Commit-tee. Informed consent was obtained from all individual participantsincluded in the study.

2.3. Procedures

2.3.1. Physical Activity Program

Children who participated in the study were given a 3-weekly, 60 min./day/a week program for 4 weeks during which the selected sporting games and the ever-increasing walking program were applied. The physical activity schedule was prepared by considering the age and condition of the children so that the heart rate of the children is between 120-140 (7).

	1. week	**2. week**	**3. week**	**4. week**
1.day	30 min. walk	15 min. warm-up/ 15 min. basketball	15 min. warm-up / 30 min. football	45 min. walk
2.day	45 min. walk	15 min. warm-up/ 20 min. basketball	15 min. warm-up / 45 min. football	60 min. walk
3.day	60 min. walk	15 min. warm-up/ 25 min. basketball	15 min. warm-up / 60 min. football	75 min. walk

2.3.2. Blood Test Procedure

Venous blood samples were collected from the children who participated in the study between the hours 09:00 and 10:30 in the morning laboratory of the pediatric patients hospital one day before and one day after the 4 week physical activity program. Blood samples were taken from the Nüve-NF800 device centrifuged at 4000 rpm for a total of 7 minutes, after which the serum were separated. Serum TSH, T3, T4 levels were measured using the ABBOTT ARCHITECH-C 16000 autoanalyzer.

2.4. Statistical analyses

In the statistical analysis of the data obtained in the study, SPSS package program SPSS 22.0 statistical program (SPSS Inc., Chicago, Illinois, ABD) was used. Paired Samples T tests were used to analyze the difference between the Independent Samples T and the pre-test and post-test of the groups in the comparison of the binary groups.

3. Results

In Table 1, the measured values of obese subjects (n = 12) were compared between pre-test and post-test body weight pre-test 79,4750±9,63612 and post-test 76,5583±8,99338. TSH values pre-test 2,4475±1,13860 and post-test 2,3400±,90,526 were found. T3 values

were 4,2158±,31984 in pre-test and 4,5192±,30282 in post-test respectively, T4 values were found as pre-test 1,1258 ±,09337 and post-test 1,0825±,37242.

In Table 2, the measured values of overweight subjects (n = 15) were compared between pre-test and post-test body weight pre-test 69,9067 ± 4,85158 and the post-test is 66,8133 ± 4,61811. TSH values were found to be 2,7167 ± 8,2195 for pre-test and 2,2960±,92330 for post-test. T3 values were pre-test 4,0960 ±, 27302 and post-test 4,5933±,45940 while T4 values were found as pre-test 1,1260±,12040 and post-test 1,0420 ±, 13143.

In Table 3, between-group analysis of pre-test differences of measured characteristics of obese and overweight subjects were -3,0917 ± 1,05353 in body weight and -3,033 ± 41,22618 in overweight group. TSH values were found in the obese group, 1075 ± 1,16342 and in the overweight group, 4207 ±, 96372. T3 values are in the obese group; , 3033 ±, 29940 and 4973 ± 43895 in the overweight group, while T4 values were found in the obese group, 0433 ±, 40264 and overweight group, 0840 ±, 18446.

Table 1: Analysis of measured values of obese subjects (n = 12) between pre-test and post-test

		means	std. deviation	t	p
WEİGHT (kg)	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		
TSH (µU/ml)	Pre-test	2,4475	1,13860	0,320	0,755
	Post-test	2,3400	,90526		
T3 (ng/dl)	Pre-test	4,2158	,31984	-3,510	**0,005**
	Post-test	4,5192	,30282		
T4 (ng/dl)	Pre-test	1,1258	,09337	0,373	0,716
	Post-test	1,0825	,37242		

Table 2: Analysis of measured values of overweight subjects (n = 15) between pre-test and post-test

		means	std. deviation	t	p
WEİGHT (kg)	Pre-test	69,9067	4,85158	9,771	**0,001**
	Post-test	66,8133	4,61811		
BMI	Pre-test	26,3600	,24437	8,810	**0,001**
	Post-test	25,2200	,43458		
TSH (µU/ml)	Pre-test	2,7167	,82195	1,691	0,113
	Post-test	2,2960	,92330		
T3 (ng/dl)	Pre-test	4,0960	,27302	-4,388	**0,001**
	Post-test	4,5933	,45940		
T4 (ng/dl)	Pre-test	1,1260	,12040	1,764	0,100
	Post-test	1,0420	,13143		

Table 3: Analysis of pre-post test differences of measured characteristics of obese and overweight subjects between groups

		means	std. deviatin	t	p
WEİGHT (kg)	Obese	-3,0917	1,05353	0,004	0,997
	Overweight	-3,0933	1,22618		
BMI	Obese	-1,5000	1,02336	-1,199	0,242
	Overweight	-1,1400	0,50114		
TSH (µU/ml)	Obese	-,1075	1,16342	0,766	0,451
	Overweight	-,4207	,96372		
T3 (ng/dl)	Obese	,3033	,29940	-1,305	0,204
	Overweight	,4973	,43895		
T4 (ng/dl)	Obese	-,0433	,40264	0,349	0,730
	Overweight	-,0840	,18446		

4. Discussion

The aim of this study is to examine the effects of low-intensity physical activity programs on thyroid hormone levels in obese and overweight boys. Based on the available analyzes, it was determined that body weight decreased in the obese group after physical activity and T3 values increased in favor of the post test, and other values were found to be within normal range. Overweight children were found to have decreased body mass and BMI values, and T3 values increased in favor of the posttest. There was no significant difference between the groups in the pre-test differences of the measured characteristics of obese and overweight subjects ($p>0,05$).

When the studies are examined; Thyroid functions are generally normal in obese people, but VKI (Body Mass Index) and TSH (Thyroid Stimulating Hormone) are positively related; we have shown that TSH levels are slightly increased, T4 values are normal, and T3 values are slightly higher than normal or normal in obese subjects when compared to normal weight subjects (8,9). There is also normal or slightly elevated T3 levels when obesers are compared to those who are not overweight. T3 level showed a positive correlation with resting energy consumption and metabolic rate (10,11).

In general, when the results of current studies are examined; obesity and thyroid functions. It has been shown in recent studies that serum TSH levels are higher in obese children compared to non-obese subjects, and that free and total T4 levels are not accompanied by dropouts (12,13,14,15).

Another study suggests that elevated TSH and free T3 levels increase resting energy consumption and thus total energy consumption, and that this change is an adaptation process to reduce energy that can be converted into fat (16,17,18). Again, in these studies, free T3 levels were significantly higher in the obese group than in the control group, but there was no difference between the two groups in terms of free T4

levels (19,20,21,22,). The data in our study are similar to those obtained in the literature. It is suggested that obese and overweight subjects have an adaptation process to change the body weight and to increase the T3 values and to reduce the energy that can be converted to fat, which is the other parameters at normal level.

As a result, it can be said that the program of low intensity physical activity applied to obese and overweight children affects the level of T3 hormone from thyroid hormone levels and also supports the change in body weight.

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