



Contents lists available at ScienceDirect

# Diabetes & Metabolic Syndrome: Clinical Research & Reviews

journal homepage: [www.elsevier.com/locate/dsx](http://www.elsevier.com/locate/dsx)



## Original Article

# Thyroid hormones, lipid profile and anthropometric changes after programmed weight loss in Palestinian obese adult females

Saleh Mwafy<sup>a,\*</sup>, Maged Yassin<sup>b</sup>, Raed Mousa<sup>a</sup>

<sup>a</sup> Department of Biology, Faculty of Science, Al-Azhar University of Gaza, Gaza Strip, Palestine

<sup>b</sup> Faculty of Medicine, The Islamic University of Gaza, P.O. Box 108, Gaza Strip, Palestine

## ARTICLE INFO

### Article history:

Received 28 October 2017

Accepted 12 December 2017

Available online xxx

### Keywords:

Thyroid hormone

Body-Mass index

BMI

Weight loss

## ABSTRACT

**Objective:** we aimed to investigate the changes in thyroid hormones, lipid profile and anthropometric measures after programmed weight loss in Palestinian obese adult females

**Materials and methods:** This prospective study included 94 obese female (20–50 years old) as cases and 94 Non-obese of same age as controls for baseline comparisons. Obese female were assigned for low calorie diet (1200–1500 Kcal/day) in addition to a daily program of therapeutic exercise for six month. Parameters were measured, statistically analyzed and compared with control before and after study.

**Results:** baseline measurements showed significant differences between cases and control regarding BMI, TG, TC, LDL-C, TSH, T3 and T4. After six months of low calorie diet and exercise there was a significant decrease in BMI, TC, TG and LDL-C in cases as compared to their levels before the study ( $P \leq 0.05$ ). TSH was significantly increased, while, T3 and T4 were significantly decreased in the cases as compared to their levels before the study. Statistically significant correlations were reported between different parameters of the study.

**Conclusions:** Low calorie diet and moderate intensity therapeutic exercise significantly improved the deteriorated health indicators in the cases which justifies the necessity for introducing such low calorie diet coupled with moderate exercise

© 2017 Diabetes India. Published by Elsevier Ltd. All rights reserved.

## 1. Introduction

Obesity is considered a worldwide health problem, with rising prevalence of overweight and obesity in both developing and developed countries [1]. The increasing prevalence of obesity has been also reported in Palestine [2] in general and Gaza strip in particular [3]. Thyroid hormones (TH) act on several aspects of metabolic and energy homeostasis influencing body weight, thermogenesis, and lipolysis in adipose tissue, in addition, it is one of the conventional risk factors for cardiovascular disease (CVD), hypertension, diabetes, hyperlipidaemia and various endocrine disorders [4]. Thyroid hormones play a key role in regulating metabolism through the modulation of thermogenesis and energy expenditure. The relationships between thyroid

stimulating hormone (TSH), TH levels, body weight, and adipose tissue homeostasis have been the focus in several studies, but it is still not completely understood [5–7]. A dietary regimen that induces weight loss but maintains proper nutrition remains the most effective nutritional intervention. Several observational studies have suggested that dairy food may facilitate weight loss, particularly in people with obesity and overweight individuals [8,9]. After weight loss, TSH, triiodothyronine (T<sub>3</sub>), and thyroxine (T<sub>4</sub>), have been described to either increase or decrease [10,11]. Exercise affects the activity of many glands and the production of their hormones. One of the glands affected is the thyroid [12,13]. In this study, we aimed to evaluate the alterations in TSH, T<sub>3</sub>, T<sub>4</sub>, BMI and lipid profiles before and after weight loss, based on low calorie diet and moderate intensity therapeutic exercise among Palestinian obese females. To the best of our knowledge, after searching published scientific works, the present work could be the first that directly investigates the association of thyroid hormones, lipid profile and anthropometric changes after programmed weight loss in obese Palestinian adult females

\* Corresponding author at: Department of Biology, Faculty of Science, Al-Azhar University of Gaza, P.O. Box 1277, Gaza Strip, Palestine.

E-mail addresses: [smwafy@hotmail.com](mailto:smwafy@hotmail.com) (S. Mwafy), [myassin@iugaza.edu.ps](mailto:myassin@iugaza.edu.ps) (M. Yassin).

<https://doi.org/10.1016/j.dsx.2017.12.009>

1871–4021/© 2017 Diabetes India. Published by Elsevier Ltd. All rights reserved.

## 2. Materials and methods

### 2.1. Study population and experimental design

This prospective study includes 188 samples based on evaluation of obesity among adult females aged (18–50) years in Gaza strip. Cases comprised 94 obese female with BMI >30 kg/m<sup>2</sup> and equal number normal weigh apparently healthy female with BMI 18.5–24.9 kg/m<sup>2</sup> as a control group for baseline comparisons. Obese females were maintained on low calorie diet (1200–1500 Kcal) and therapeutic exercise on electrical treadmill (motorized 2.5 horses, made in Taiwan, 2004). The subjects performed these daily exercises for six month. For all subjects BMI was calculated and blood samples were withdrawn from cases before and after the study. The study was conducted at private nutritional centers and clinical nutritional center at the main general hospitals in Gaza strip during the period from October 2015 to November 2016. Exclusion criteria included pregnant women and females who had chronic illness or those who are receiving special medical treatments. For ethical consideration, the necessary approval to conduct this study was obtained from Helsinki committee with ethical approval number PHRC/HC/30/15 in the Gaza Strip and all study participants signed the informed consent form of the study.

### 2.2. Specimen collection and processing

Blood collected in a lavender top tube (EDTA and serum). Whole blood collected and tested during 2 h. Serum was separated by centrifugation of whole blood for 10 min at 2500 rpm, the separated samples were frozen at –20 °C. Allow sample tubes to reach room temperature (15–30 °C) before performing the assay.

### 2.3. Biochemical analysis

Cholesterol and triglycerides were determined by enzymatic colorimetric method [14,15] while liquid HDL-C precipitant for the determination of HDL-C [16]. TSH, T<sub>3</sub> and T<sub>4</sub> concentration were determined using enzyme-linked immunosorbent assay (ELISA) [17].

**Data analysis:** Data were tabulated, encoded and statistically analyzed using the IBM SPSS software version 21.0 for windows (Statistical Package for the Social Sciences Inc, Chicago, Illinois). Means compared by independent-samples *t*-test, and percentage change was also calculated. *P*-value < 0.05 was considered as statistically significant cutoff.

**Table 1**  
Socio-demographic characteristics of the study population.

Character	Non-Obese female		Obese female		Chi Square	P-value
	No.	%	No.	%		
<b>Age (Year)</b>					0.366	0.833
20–30	35	37.2	39	41.5		
31–40	37	39.4	34	36.2		
41–50	22	23.4	21	22.3		
Mean ± SD	(33.26 ± 7.8)		(30.12 ± 9.3)			
<b>Marital status</b>					6.805	0.009
Single	18	19.1	34	36.2		
Married	76	80.9	60	63.8		
<b>Education</b>					18.7	0.001
Primary	6	6.4	19	20.2		
Secondary	30	31.9	45	47.9		
University or Diploma	58	61.7	30	31.9		

Each reading represents Mean ±SD of 94 subjects

The significant of difference was checked by one-way ANOVA test (compare all vs. control), significant at *P* ≤ 0.05.

## 3. Results

**Table 1** shows the general socio-demographic characteristics of the study population with no significant differences between obese and non-obese females in either group. The age of the study population ranged from 20 to 50 years with mean of (30.12 ± 9.3) for obese females and (33.26 ± 7.8) for non-obese females ( $\chi^2 = 0.366$  and *P* = 0.833). As indicated in **Table 2**, BMI in obese females was significantly higher compared to non-obese females (38.5 ± 7.2 vs 23.4 ± 1.0, *P* = 0.001). **Table 3** illustrates that cholesterol, triglyceride and low-density lipoprotein (LDL-C) were significantly increased in obese compared to non-obese females (*P* ≤ 0.05). The mean level of TSH was significantly decreased, while significant increase in the mean levels of T<sub>3</sub> and T<sub>4</sub> in obese compared to non-obese females (*P* ≤ 0.05) **Table 4**.

After six month of low calorie diet and the exercise program (**Tables 2–4**), the body mass index in obese females were significantly lower after weight loss compared to their levels before the study (23.5 ± 1.0 vs 38.5 ± 7.2 respectively, with% change = –39, *P* = 0.001). The mean levels of cholesterol, triglyceride and low-density lipoprotein were significantly decreased in obese females after weight loss compared to their levels before the study (163.5 ± 14.81, 124.9 ± 25.4 and 96.9 ± 10.7 vs 186.4 ± 29.78, 153.4 ± 34.8 and 124.3 ± 28.23, respectively, *P* ≤ 0.05). TSH level in obese females were significantly increased after weight loss compared to the mean before weight loss (3.2 ± 1.7 vs 2.05 ± 0.6, % change 56.1, *P* ≤ 0.05). In contrast, the levels of T<sub>3</sub> and T<sub>4</sub> were significantly decreased in obese females after weight loss compared to their levels before the study (1.03 ± 0.33 and 7.4 ± 1.30 vs 1.36 ± 0.24 ng/ml and 8.77 ± 1.67 respectively, *P* ≤ 0.05).

Analyses using the Pearson correlation coefficient revealed significant correlations between BMI, TSH and T<sub>3</sub> with study parameters shown in **Table 5**. Among these important correlations are the positive correlation that reported between BMI with cholesterol, triglyceride and LDL-C and a negative correlation with TSH (*P* ≤ 0.01). Statistically significant negative correlation between TSH with T<sub>3</sub>, T<sub>4</sub> triglyceride, and LDL-C (*r* = –0.509, –0.456, –0.186 and –0.219, *P* ≤ 0.01) were also reported. In addition, T<sub>3</sub> showed strong positive correlation with T<sub>4</sub> (*r* = 0.8, *P* = 0.001) (**Fig. 1**).

## 4. Discussion

Thyroid hormones regulate the rate of metabolism and affect the growth rate, maintenance of body weight, rate of energy use from blood glucose and heart rate [18]. It influence key metabolic pathways which control energy balance by regulating energy storage and expenditure [19]. Changes in thyroid hormone concentrations may be regarded as an adaptation process in weight change. Recent studies have shown that changes in thyroid hormone levels, even within the physiological ranges, may contribute to the deteriorating of atherogenic lipid profile [20–22]. The main objective was to study the changes in thyroid hormones, lipid profile and anthropometric measures after programmed weight loss in Palestinian obese adult females.

Our results revealed that the body mass index in obese females were significantly lower after six month of low calorie diet and the exercise program, compared to their levels before the study. These results were coinciding with the results of Klijn et al., from the Netherlands [23]. Caloric balance is one of the most important factors that relates to obesity. Overweight and obese results from an energy imbalance caused by eating too many calories and not getting enough exercise. The effects of exercise can add to dietary interventions to enhance loss of fat mass and improve long-term maintenance [24]. The mean levels of cholesterol, triglyceride and

Download English Version:

<https://daneshyari.com/en/article/8658751>

Download Persian Version:

<https://daneshyari.com/article/8658751>

[Daneshyari.com](https://daneshyari.com)