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Original Research

Successful dietary intervention plan for Hashimoto's thyroiditis: A case study

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Abstract

Introduction: A 49-year-old obese woman, medically free from any of chronic diseases, was newly diagnosed with Hashimoto's thyroiditis (HT) of unknown cause by the specialized internist endocrinologist. **Methods:** To manage the case, a modified autoimmune Paleo low-calorie diet (1200 kcal) was recommended for 6 months. The anthropometric measurements, body composition, fasting blood glucose, fasting insulin, non-HDL cholesterol, HDL, triglycerides (TG), thyroxine (T4), triiodothyronine (T3), thyroid stimulating hormone (TSH), and thyroid peroxidase (TPO) were measured on basal level and every 30 days until day 180. **Results:** Showed a significant ($p < 0.05$) reduction in body weight, body mass index, waist and hip circumference, waist to hip ratio, fat mass, TG, non-HDL cholesterol, TSH, and TPO, while T3 and T4 remained within normal reference range. Also, there was a significant elevation in the HDL cholesterol level with statistically non-significant ($p > 0.05$) decrease in fasting insulin. **Conclusion:** The diet improves the TSH, TPO, anthropometric, body composition, HDL and non-HDL cholesterol levels. These improvements will help the HT patients to improve their health and quality of life, as well as reduce inflammation, thyroxine treatment dose, and risk for chronic diseases associated with future hypothyroidism.

Keywords: Autoimmune diet, Case report, Hashimoto thyroiditis.

Introduction

Goitrous autoimmune thyroiditis (AITD), or Hashimoto's thyroiditis (HT) was considered as one of the most common chronic human autoimmune diseases responsible for considerable morbidity in women [1] especially if there is genetic susceptibility together with environmental factors [2]. The presence of thyroid autoantibodies (TAbs) against two major thyroid antigens, thyroid peroxidase (TPO) and thyroglobulin (Tg), in the patients' sera is the principal biochemical characteristic of the disease [3]. The disease results in hypothyroidism due to the gradual atrophy of thyroid tissue followed by the invasion of the gland with lymphocytic cells, follicular atrophy, and hyperemia accompanied by oncocytic metaplasia of follicular cells [4]. According to previous studies, antithyroid antibodies were found to be high in patients with undiagnosed celiac disease. However, committing to a six-month gluten free diet reduced antibody titers and showed lower autoimmune response [5]. Furthermore, when patients with celiac disease and hypothyroidism follow a gluten-free diet, they show improvements in food and medications absorption as a result of intestinal healing, thereby needing lower doses of thyroid medication [6].

The effects of a gluten-free diet on patients who have autoimmune disease (ATD) but not celiac disease have not been evaluated yet. In spite that some researchers report observing benefits in patients, this remains controversial.

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Also, the new dietary protocol called the autoimmune protocol (AIP) [7] which was used to help people with autoimmune diseases, such as the inflammatory bowel disease is hard to follow for many patients as well as it may not be helpful for all cases of HT. Also, previous studies did not study the effect of AIP diet on HT patient anthropometric and body composition. Therefore, I planned a special diet which is a mixture of Paleo, gluten-free, and vegan diet and examined the effect of this diet on newly diagnosed HT patient anthropometry, body composition, insulin, lipid profile, and thyroid function test including TPO.

Case report

A 49-year-old woman, married and with three children, non-smoker, non-alcoholic, and medically free from any chronic diseases was newly diagnosed with HT of unknown cause by the specialized internist endocrinologist. She was medically insured at King Abdullah University Hospital and an assistant professor of clinical nutrition. She sought medical advice after she noticed her body weight started to increase although her usual food intake had not changed, as well as fogginess, constipation, and consistent fatigue. The woman decided to follow a special diet designed by her for six months and not taking any medications.

The patient blood test findings at diagnosis (basal) are shown in Table 1. The insulin and fasting blood glucose (FBG) data were within the normal reference range, 9.97 mIU/L and 5.78 mmol/L respectively. The total cholesterol, low-density lipoprotein cholesterol (LDL), and triglycerides (TG) were elevated above normal, while the high-density lipoprotein cholesterol (HDL) was extremely low. In addition, the thyroid function test and the thyroperoxidase antibodies were tested and the basal results revealed that the patient has a positive TPO (945) and elevated thyroid stimulating hormone (TSH), while the triiodothyronine (T3) and the thyroxine (T4) levels were within the normal reference range (Table 1).

In addition, the patient anthropometric and body composition was analyzed at diagnosis. The woman was obese when diagnosed: her body mass index (BMI) was 30.47 kg/m^2 and her waist to hip ratio (WHR) was 0.9 (Table 1).

Before diagnosis, the patient ate every kind of food and never followed a dietary program. On average, she usually consumed about 2000 Kcal/day. Also, she took nutrition supplements of 1000 mg Omega-3 daily and one-a-day tablets for menopausal woman, which contained multivitamin/multimineral and soybean isoflavonesfrom extract as 60 mg.

Before designing the interventional diet, the woman's energy requirements were calculated by giving 30–35 Kcal/day for each kilogram (kg) of the ideal body weight (IBW) [8]. The estimated energy requirement (EER) ranged between 1770–2065 Kcal/day and it was allocated into 50% for carbohydrates, 15% for protein, and 35% for fat [9]. Thus, the requirements ranged between (221–258 g/day) for carbohydrates, (66.4–77.4 g/day) for protein, and (68.8–80.3g/day) for fat.

The interventional diet was designed to provide a total energy of 1200 Kcal/day, 150 g/day of carbohydrates, 45 g/day of protein and 47 g/day from fat. The patient was advised to take three main meals and two snacks; around 240 Kcal breakfast, 480 Kcal on lunch, 320 Kcal on dinner and around 80 Kcal for each snack. Generally, the meals' calories were translated into food menus and these menus were prepared to be a mixture of Paleo, gluten-free, and vegan diet (modified autoimmune Paleo diet, (MAIPD). In these menus all wheat-based bread and pasta, and all foods containing gluten – such as cereals, baked goods, snack foods, alcoholic beverages – were avoided. All canned and processed foods, caffeine, seaweed, high glycemic index food, soy, beans and legumes, cruciferous vegetables, and nightshades were also avoided. On the other hand, eggs, plain dairy products, meat and fish, fats and oils, nuts and seeds, corn, quinoa, rice, herbs, spices, fruits, and vegetables, except the cruciferous and nightshades, were allowed.

All the blood tests, anthropometric and body composition analysis were repeated every 30 days after starting the dietary intervention for a total of six times throughout the study on days 30, 60, 90, 120, 150, and 180.

Over the dietary intervention, results revealed a positive improvement in her

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Table 1: Changes of anthropometry, body composition and biochemical parameters over time for a woman with Hashimoto thyroiditis and received medical nutritional therapy.

	Days of dietary plan follow up						
Variable	**Basal**	**30**	**60**	**90**	**120**	**150**	**180**
Age (years)	49.0	49.1	49.2	49.3	49.4	49.5	49.6
Anthropometric measurements							
Weight (Kg)	86.0	83.0	79.50	76.5	74.00	72.0	70.0
Height (Cm)	168.0	168.0	168.0	168.0	168.0	168.0	168.0
BMI (kg/m^2)	30.47	29.41	28.17	27.10	26.22	25.51	24.80
Waist circumference (cm)	106.0	102.0	96.0	91.0	88.0	85.0	83.0
Hip circumference (cm)	118.0	115.0	112.0	109.0	107.0	106.0	105.0
WHR	0.90	0.87	0.86	0.83	0.82	0.80	0.79
Body composition							
Fat mass %	37.5	34.5	31.7	28.8	27.0	26.1	25.3
Fat free mass %	62.5	65.5	68.3	71.2	73.0	73.9	74.7
Total body water %	45.2	47.6	49.3	51.7	52.6	53.8	55.0
Dry lean weight %	13.8	13.5	13.2	13.0	12.8	12.6	12.4
Biochemical measurements							
Insulin (mIU/L)	9.97	9.30	7.94	7.77	7.56	7.50	7.3
Fasting blood glucose (mmol/L)	5.78	5.70	5.66	5.50	5.60	5.44	5.35
Total cholesterol (mmol/L)	8.47	7.10	6.50	5.90	5.24	4.67	4.32
LDL (mmol/L)	6.30	6.15	5.76	4.89	4.63	4.20	3.97
HDL (mmol/L)	0.77	0.85	0.98	1.10	1.24	1.29	1.34
Triglycerides (mmol/L)	2.70	2.51	2.23	2.00	1.88	1.73	1.62
Triiodothyronine T3 (pmol/L)	5.23	4.74	4.30	4.23	4.10	4.38	4.01
Thyroxine T4 (pmol/L)	10.67	11.81	13.20	14.33	14.77	13.16	16.52
Thyroid stimulating hormone TSH (mIU/L)	5.33	4.51	3.30	3.00	2.63	1.36	0.81
TPO (positive)	954	940	865	725	612	543	423

anthropometric and body composition. Insulin and FBG decreased significantly (7.3 mIU/L, 5.35 mmol/L) but remained within the normal range. The patient's total cholesterol, LDL, and TG levels decreased and the HDL level was increased significantly. In addition, the TSH and the TPO levels significantly decreased while the T3 and T4 levels remain within normal reference range (Table 1).

Discussion

It is widely known that thyroid dysfunction affects the patient's physical and mental well-being and decreases the personal health-related quality of life [10]. Results from this prospective, longitudinal case study revealed that the MAIP weight reducing diet was helpful in improving the anthropometric, body composition, and biochemical data of the HT patient. The significant decreases in body weight, BMI, WHR, fat mass, and fasting insulin are associated with minimizing the risk of type 2 diabetes and cardiovascular diseases (CVD). Recently, a study reported that total homocysteine as independent risk factor for CVD is positively associated with BMI, WHR, and fat mass [11]. By the time of dietary intervention, the reductions in anthropometric measures and fat mass were correlated with the reductions in TSH and TPO. These findings are in line with Marzullo et al [12], although other

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studies reported conflicting results regarding the correlations between body weight, BMI, fat mass percentage, and the thyroid function [12–15].

It is more common among hypothyroidism patients to suffer from dyslipidemia [16]. However, the mechanism of how thyroid gland hormones can influence lipid profile is not yet clear [17]. In this case study, total cholesterol, LDL, and TG were significantly reduced and HDL was significantly elevated. These findings assure the effect of the diet not only on anthropometry and body composition but also on lipid profile of hypothyroidism patients. On the contrary, in a dietary interventional randomized controlled study conducted on subclinical hypothyroidism, children who followed a diet consisting of 300 ml of full fat milk and 5 grams butter on each slice of bread daily, green vegetables five times per week and beef three times per week for 6 months did not report significant effects on the participants' lipid profile at the end of the study, though slight, non-significant increases in total cholesterol, LDL and HDL levels and a decrease in TG and total cholesterol/HDL over time were observed in the intervention group [18].

Dietary interventions improve the symptoms of autoimmune thyroid dysfunction and may eliminate the symptoms and the disease. For instance, gluten-free diet with vitamin and minerals supplements was used for a patient diagnosed with HT, celiac disease, and diabetes, to improve his clinical symptoms and laboratory results [19]. Another study compared patients on thyroxin treatment but not adhering to gluten-free diet with patients only following gluten-free diet and found that gluten-free diet patients were able to normalize their TSH levels without taking T4 supplementation [20]. Others suggested the use of the Paleolithic-style diet to prevent HT [21]. Therefore, the improvements in clinical and biochemical prognosis of HT can be explained by the using of the caloric restriction MAIPD to lower the intestinal and the thyroid gland inflammation.

Conclusion

The MAIPD was able to improve the TSH, TPO, anthropometric, body composition, HDL, and non-HDL cholesterol levels. These improvements will help the HT patients to improve their health and quality of life as well as reduce inflammation, thyroxin treatment dose, and risk for chronic diseases associated with hypothyroidism in future.

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Conflict of interest

The author declares no conflict of interest.

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