CASE REPORT

Nutritional Management of Hashimoto's Thyroiditis: A Case Report

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ABSTRACT

Introduction • thyroiditis (HT) is prevalent in about 1 in 1000 people. A 39-year-old female diagnosed with HT was having unsuccessful symptom resolution with conventional thyroxine (T4) replacement therapy. In 60 days, there was a remarkable reduction of thyroid antibodies (Abs), improvement of thyroid hormones, and cardiometabolic biomarkers following a Paleolithic diet (PD).

Case Description • A patient unable to lose weight or alleviate gastrointestinal and neurological symptoms after maintaining clinical thyroid stimulating hormone (TSH) levels through conventional T4 medication therapy saw significant reductions in thyroglobulin (47.5%) and thyroid peroxidase (28.9%) Abs, and significant improvement in TSH (36.4%) total T4 (21.5%) and total T3 (33.3%) after 60-day treatment intervention with the PD. Improvements were also seen in HDL (31.6%), LDL (8.9%), total cholesterol (14.9%), and weight (11.5%). The client adhered to a weekly step process of avoidance of foods that have known hypersensitivities and consumed high-quality fats, fermented foods, filtered water, and green tea, and took a daily nutritional supplementation of vitamin D used in conjunction with a homemade turmeric spice blend. Upon final follow-up, the client had a remarkable reduction in symptoms.

Conclusion • The Paleolithic diet may be used as a nutritional therapeutic protocol in those with HT with who have complications reducing weight and alleviating gastrointestinal and neurological symptoms no adverse events. Future research should be performed on larger, more diverse populations to develop population-based clinical practice guidelines. Specific areas of research, such as the long-term effects of the PD on HT, comparisons with conventional treatments, and exploring the mechanisms by which PD influences HT symptoms and markers will be beneficial to this research. (*Adv Mind Body Med.* 2024;38(2):##-##.)

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INTRODUCTION

Hashimoto's Thyroiditis (HT) is an autoimmune thyroid disease (AITD) characterized by the loss of immune tolerance resulting in elevated thyroid stimulating hormone (TSH), low levels of thyroxine (T4) and triiodothyronine (T3), increased thyroid peroxidase (TPO) and thyroglobulin (Tg) antibodies (Ab), and in certain circumstances increased TSH-receptor (R) Abs.[1] Several common symptoms experienced include fatigue, weight gain, brain fog, chronic inflammation, and gastrointestinal dysfunction.[1,2] This case presents a female diagnosed with HT following a late adolescence through adulthood diagnosis of 'Graves' disease who transitioned from conventional T4 therapy to an integrated therapeutic regime utilizing the Paleolithic diet (PD) as a significant treatment strategy for relief from persistent symptoms.

Presenting Concerns

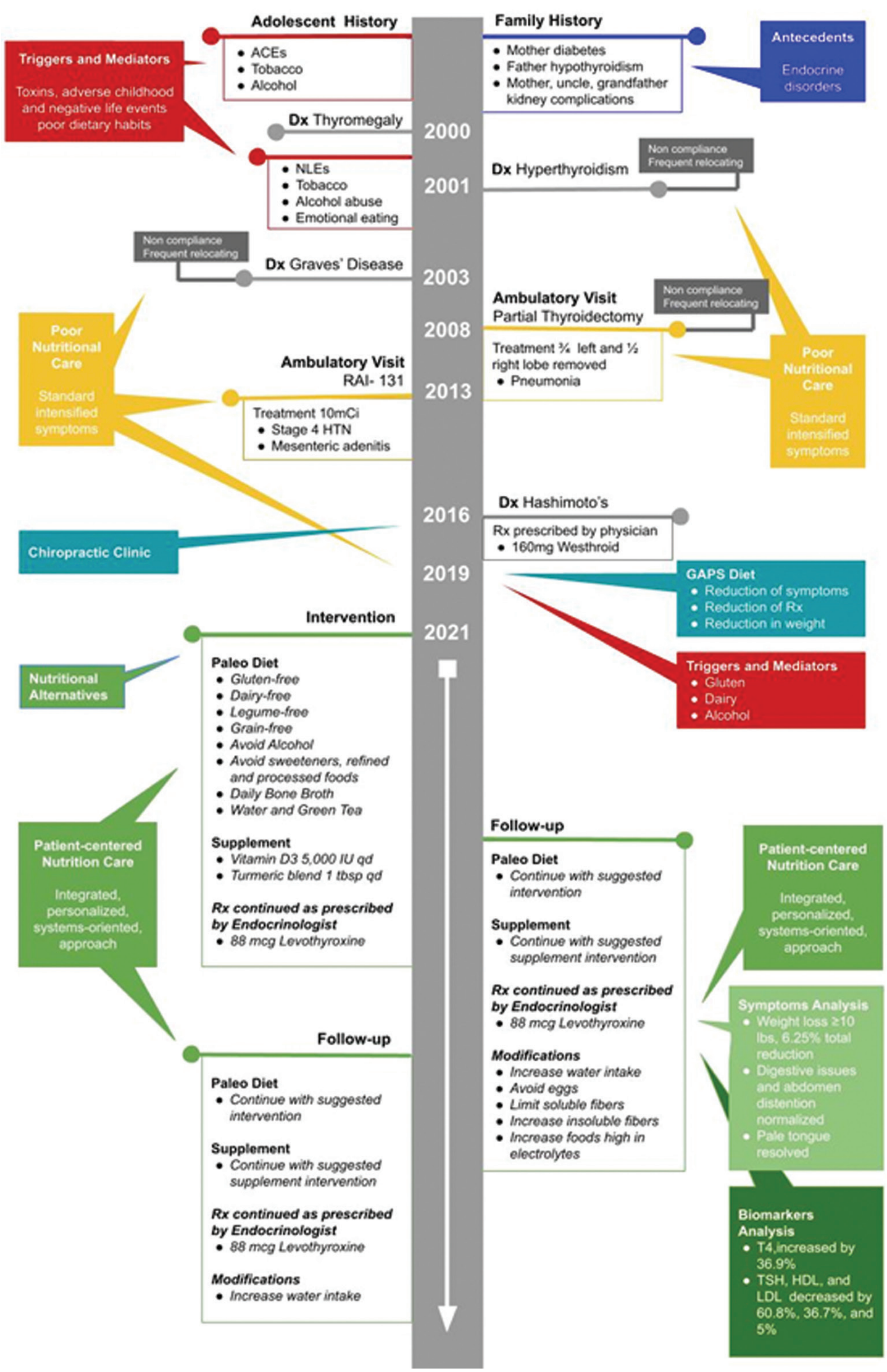
A 39-year-old female presented with HT and current concerns of abdominal weight gain, poor gastrointestinal health, chronic fatigue, and high cholesterol. Her total T3 (T-T3) was abnormally low. She reported abdominal weight gain, episodes of gastrointestinal esophageal reflux, chronic hunger, food cravings, increased thirst with dry lips, low energy, low libido, bloating, constipation, poor sleep habits, and mental sluggishness.

History

The client reported a diagnosis of thyromegaly (abnormally enlarged thyroid gland) at age 17, a diagnosis of hyperthyroidism (increase thyroid activity) after childbirth at age 19, and then a diagnosis of GD at age 21. The client also revealed an emergency partial thyroidectomy in 2008 and subsequently received 10mCi of orally radioactive iodine (RAI-131) after 5 years of non-adherence to the thyroidectomy treatment plan. Four years after RAI-131, the client reported severe weight gain, extremely high Tg and TPO Ab, high TSH, very low T-T4 and T-T3-, and hypercholesterolemia.

The client further disclosed that she had extensive childhood through adolescent abuse and exposure to many years of adulthood trauma that led to significant life challenges, ensuing substance abuse (including smoking at an early age and excessive alcohol abuse), and intense emotional eating. It is crucial to address psychological trauma in clients with AITD given that research indicates 85% of reported autoimmune cases also involve a history of extremely stressful negative life events. Moreover, 27% of patients with AITD are found to have experienced significant stress within a year of diagnosis onset.[3] Stress impacts the hypothalamic-pituitary-adrenal (HPA) axis and the sympathoadrenal system simultaneously leading to endocrine and nervous system dysregulation thereby affecting the hypothalamic-pituitary-thyroid (HPT) axis and initiating a protective autoimmunological process. Often stressful events contribute to unhealthy food choices leading to intake of foods that cause hypersensitivities and additional metabolic stress. Additionally, the biochemical mechanisms of endured stress deplete available nutrients required for enzymatic and cellular functions, which in turn can play a significant role in the regulation of immuno-endocrine responses.

Timeline



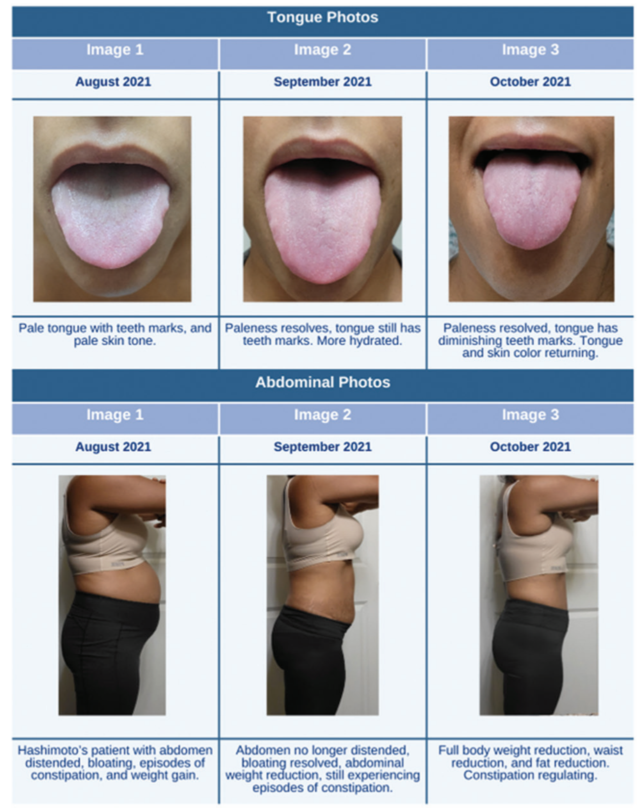
Clinical Findings

The patient presented with a waistline more significant than 35 inches, BMI of 31.2 (Class I obese), dry skin with signs of hyperkeratosis on lower extremities, pale tongue with teeth marks, difficulty recalling recent events, and cold hands and feet to the touch. Clinical biomarker requisitions were drawn at Quest Diagnostic Labs and are shown in Table 1.

Clinical Data. Table 1. Evaluation of Biomarkers

Laboratory Data							
Marker	**Normal**	**Baseline**	**Result**	**30 Days**	**Result**	**60 Days**	**Result**
		8/11/21		9/13/21		10/13/21	
Lipid Biomarkers							
TC	< 200 mg/dL	255	**H**	223	**H**	217	**H**
TG	< 150 mg/dL	81	N	111	N	86	N
HDL	≥ 50 mg/dL	79	N	50	N	54	N
LDL	< 100 mg/dL	158	**H**	150	**H**	144	**H**
Thyroid Biomarkers							
TSH	0.4-4.50 mIU/L	2.58	N	1.01	N	1.64	N
FT4	0.8-11.8 ng/dL	ND	-	1.2	N	1.2	N
TT4	5.1-11.9 mcg/dL	6.5	N	8.9	N	7.9	N
TT3	76-181 ng/dL	66	**L**	66	**L**	88	N
Tg	< 1 IU/mL	ND	-	59	**H**	31	**H**
TPO	< 9 IU/mL	ND	-	232	**H**	165	**H**
Metabolic Biomarkers							
Glucose	70-99 mg/dL	111	**H**	113	**H**	93	N
Sodium	135-145 mmol/L	137	N	135	N	134	**L**
eGFR Non-African	>60 mL/min/1.73m²	74	N	77	N	86	N
eGFR African	>60 mL/min/1.73m²	85	N	90	N	100	N
Anthropometrics							
Weight	IBW = 112lbs	161	**H**	150	**H**	142.5	**H**
Waist circumference	< 35 inches	41	**H**	35	**H**	32.5	N
Rib circumference	inches	35.5	**H**	33.5	N	33	N
Hip circumference	inches	41	**H**	39	**H**	38.25	N
Cardiovascular Assessment							
Fat	%	32.27	**H**	29.99	**H**	28.19	**H**
BMI	18.5-24.9	31.4	**H**	29.3	**H**	27.8	**H**
W/H	< 0.75 ratio	1.0	**H**	0.90	**H**	0.85	**H**
W/Ht	< 0.50 ratio	0.68	**H**	0.58	**H**	0.54	**H**

Figure 1. Nutrition-Focused Physical Exam Photos (Note: pictures taken by client)



Therapeutic Intervention

At the initial visit on August 17, 2021, the client was recommended to initiate a low-calorie Paleolithic dietary regimen with 15% carbohydrates, 45% protein, and 40% fat. This intervention was selected due to the high bioavailability of nutrients found in the foods of this naturalistic, earthly style pattern of eating. The client was instructed to eliminate all sources of dairy, grains with gluten, legumes, alcohol, ultra-processed and refined foods, and foods with added sugar or sweeteners. Goitrogens (isothiocyanates that disrupt endocrine function) were not excluded because the client's diagnosis was not found to be iodine deficiency-related and iodine is required for immuno-endocrine functions. Foods included were low-glycemic non-starchy vegetables (dark leafy greens, tomatoes, peppers, garlic, cucumbers, celery, broccoli, cauliflower, asparagus, carrots, onions, mushrooms, radish, squash, etc.), low carbohydrate fruits (berries, citrus, etc.), all sources of good quality non-processed meat, eggs, healthy sources of fats (nuts, olives, olive oil, avocado, and coconut), fermented foods, herbs and spices. Beverages included 8 ounces of green tea and ≥ 48 ounces of water daily with either fresh lemon or ginger root two to three times per week. A daily supplement pre-made seasoning blend of turmeric (Table 2) - (1 tbsp) and 5000IU of vitamin D3 was also included in the protocol.

Table 2. Recommended Intervention

Week	**Protocol**	**Daily Dietary Recommendations**
1	Stews and soups	Low glycemic non-starchy vegetables and lean bone-in meats with no fats, no raw foods, no eggs, no nuts, no fruits. A minimum of 116 oz of daily homemade meat broth, and daily organic turmeric supplement, with D3 supplement.
2	Stews and soups; introduction of baked meals	
3	Stews and soups; baked meals; introduction of fats	Low glycemic non-starchy vegetables and lean bone-in meats with EVOO and avocado. No raw foods, no eggs, no nuts, no fruits. A minimum of 116 oz of daily homemade meat broth, and daily organic turmeric supplement, with D3 supplement.
4	Stews and soups; baked meals; fats; introduction of raw vegetables	Low glycemic non-starchy vegetables and lean bone-in meats with EVOO, avocado, and raw vegetables. No eggs, no nuts, no fruits. A minimum of 116 oz of daily homemade meat broth, and daily organic turmeric supplement, with D3 supplement.
5	Stews and soups; baked meals; fats; raw vegetables; introduction of eggs	Low glycemic non-starchy vegetables and lean bone-in meats with EVOO, avocado, raw vegetables, and eggs. No nuts, no fruits. A minimum of 116 oz of daily homemade meat broth, and daily organic turmeric supplement, with D3 supplement.
6	Stews and soups; baked meals; fats; raw vegetables; eggs; introduction of nuts	Low glycemic non-starchy vegetables and lean bone-in meats with EVOO, avocado, raw vegetables, eggs, and nuts. No fruits. A minimum of 116 oz of daily homemade meat broth, and daily organic turmeric supplement, with D3 supplement.
7	Stews and soups; baked meals; fats; raw vegetables; eggs; nuts; introduction of fruits	Low glycemic non-starchy vegetables and lean bone-in meats with EVOO, avocado, raw vegetables, eggs, nuts and fruits. A minimum of 116 oz of daily homemade meat broth, and daily organic turmeric supplement, with D3 supplement.
Vitamin D Supplement		**Organic Herbal Formula**
Vitamin D3 at 5000 IU 1x per day		Turmeric (curcuma longa), Sea Salt (sodium chloride), Paprika (capsicum annuum L.), Garlic (allium sativum), Onion (allium cepa) Cumin (Cuminum cyminum), Black Pepper (piper nigrum), Ginger (zinger officinal)

Follow-Up and Outcomes

At her first follow-up on September 17, 2021, the client's dietary compliance was high, and she reported improved neurological symptoms with increased gastrointestinal motility and energy. The client lost several pounds during week 1 and had gradual weight loss during the following weeks. Laboratory biomarkers were compared to the baseline visit and showed significant improvements. Total T4 increased by 36.9%, TSH decreased by 60.8%, and high-density lipoprotein (HDL) decreased by 36.7%.

During subsequent follow-ups, the client reported gastrointestinal symptom flare-ups after eating eggs, slowed GI motility after consuming high amounts of soluble fibrous foods, and headaches and bloating after consumption of alcohol. Eggs were completely removed from the protocol, soluble fibers were monitored, alcohol was to be avoided, and a mixture of Redmond's Salt (RS) and water (H_2O) (*RS* = ¼ - ½ tsp to 8oz H_2O) was recommended 30 minutes prior to workouts due to low sodium on lab documentation.

In addition, compared to baseline, biomarkers continued to show improvements. TSH normalized to 1.64IU/L. Low-density lipoprotein decreased a total of 8.9%, and total cholesterol decreased a total of 14.9% from the first blood draw to the last blood draw; upon the final visit, there was a remarkable improvement in thyroid Abs. Tg Abs was reduced by 46.5%, and TPO Abs was reduced by 28.9%. There was further improvement in glucose (111 mg/dL to 93 mg /dL), estimated glomerular filtration rate (74 mL/min/173mm^2 to 86 mL/min/173mm^2), anthropometrics (weight = 11.5% decrease), and cardiovascular risk (W/H = 1.0 to 0.85 and W/Ht = 0.68 to 0.54) with continued improvement in thyroid hormones T-T4 normalized totaling a 21.5% increase throughout the observation of the case. In contrast, T-T3 increased a total of 33.3 %.

Patient Perspective

Before therapy, I did not follow a good dietary routine. I knew I had intolerances, and I still chose to eat certain foods. I also did not exercise, did not sleep well, drank 3x per week, and did not engage in meditation practices. Before deciding to start therapy, I just 'didn't feel good. I was tired, hungry, and thirsty all the time; I always had brain fog and was always bloated. After the first two weeks, I really 'didn't feel hungry anymore. My bloating was also going away. My GERD completely ceased to exist. After 30 days, I had more energy and consistent sleep patterns. My constipation still varied. It would come and go. The best thing was being able to think much clearer and easily complete more tasks.

DISCUSSION

HDL Factors

HDL is traditionally recognized for its reverse transport role in carrying LDL cholesterol from the bloodstream and transporting it to the liver for processing and excretion. It is commonly perceived as positive when elevated. However, in AITD patients, elevated HDL levels may indicate severe inflammation and increased mortality risk.[4] U-shaped data suggests both extremely low or high levels of HDL can be detrimental in these patients.[4] Notably, a decrease in HDL during weight loss in AITD patients can correspond with metabolic improvements, as LDL levels can positively correlate with decreases in HDL levels with decreasing BMI, more prominent in females.[4] In this case, the client exhibited elevated HDL levels (baseline = 79 mg/dL) followed by a sudden decline (time point 1 = 50 mg/dL), yet later demonstrated metabolic stability with an increase to 54 mg/dL at time point 2. This data may imply that the clients decrease in HDL levels reflect metabolic improvements specific to adopting a PD lifestyle.

The Paleolithic Diet as a Dietary Intervention

Patients with HT exhibit increased Tg and TPO Abs levels, increased TSH, and decreased T-T4 and T-T3. Research suggests patients with HT have been found to consume higher intakes of animal fats, processed meats, and nuts, while controls consumed more red meat, non-alcoholic beverages, whole grains, olive oil, oily fish, and fruits.[5] Fortunately, various dietary interventions (gluten-free, dairy-free, and high protein) have shown improvements in the status of HT, leading to symptom alleviation-, reduced medication, or disease remission.[6-9] In one study, a gluten-free diet reduced Tg and TPO Abs while also increasing vitamin D levels in patients with HT.[8] Additionally, an elimination diet, which can mimic a PD, with caloric restriction that excluded certain food groups (including those that could contribute to food sensitivities such as eggs), significantly reduced TSH, Tg and TPO Abs, BMI, and body fat percentage in female HT patients.[9] Furthermore, a study revealed that low-carbohydrate/high-protein diets with specific macronutrient ranges improved the status in individuals with HT, reducing TSH, decreasing Tg and TPO Abs while increasing T3 and T4.[6] This research demonstrates the depth of how the PD can influence immune-endocrine metabolism.

Alcohol-Related Factors

Before the initiation of the dietary intervention, the client drank immoderate amounts of alcohol. Alcohol is well-known for its toxic role in weight gain. While some research reports a reduced risk of HT with moderate alcohol consumption,[10,11] recent research concludes that moderate amounts of alcohol can suppress T3 and T4 hormone production, and high doses of chronic alcohol consumption can lead to an increase in the development of TPO Abs and worsen autoimmunity[10,12] along with metabolic state. The PD recommends avoidance of alcoholic beverages due to their high toxic content and food processing procedures.[13] The client, in this case, reported headaches and bloating shortly after consuming very low doses of alcohol and a history of AITD following a long-term of use of alcohol. Thus, eliminating alcohol as part of the PD may have improved overall hormone production via the hypothalamic-pituitary-thyroid axis pathway.

Improved Motility

The traditional PD recommends avoidance of legumes, potatoes, and corn[13,14]; new evidence suggests that Neanderthals also ate wild-grown barley and legumes.[14] The client did report occasionally eating legumes, corn, and potatoes in very small amounts (≤2 oz), with no adverse effects. However, after eating large amounts of corn, legumes, and eggs, the client reported slowed bowel motility. New evidence shows that corn can be a major food sensitivity for patients with HT as well as eggs.[9] Although eggs are usually found in the PD, it is worth noting ovalbumin proteins have been utilized in vaccinations eliciting an immune response against viruses. This could explain the clients exacerbated sensitivity and elevated levels of Tg and TPO Abs when regularly exposed to ovalbumin.

Adipocyte and Thyroid Interplay

Recent research has highlighted a notable association between thyroid Abs biomarkers on labs, including TSHR, Tg, and TPO, and increased visceral and subcutaneous adipose tissue.[15] The expression of thyroid receptors on adipocytes is upregulated during adipogenesis (exacerbated by poor dietary habits),[15] which can contribute to inflammation and metabolic dysregulation emphasizing the complexities between thyroid signaling and adipose tissue dynamics in patients AITD. More importantly, deiodinase-2 enzymes contribute to the generation of intracellular T3 within adipocytes,[15] which these mechanisms can further influence immuno-endocrine functions. Over the course of 60 days, the client experienced significant weight reduction (161 lbs to 142 lbs) corresponding with significant decreases in Tg (59 IU/mL to 31 U/mL) and TPO (232 IU/mL to 165 IIU/mL) Abs, an increase in T-T3 by 33.3%, and a reduction in body fat percentage (32.27% to 28.19%) resulting in a decrease of BMI (31.4 to 27.8). These biomarkers document the essential role the PD plays in improvement of AITD.

Key Take-Aways

The clients' adoption of the PD intervention, which focused on the elimination of ultra-processed high-density carbohydrates, refined and processed foods, and dairy products while emphasizing the consumption of core food groups such as fruit vegetables, fungi, tubers seeds, nuts, and meats,[14] lead a to a significant reduction in weight, particularly adipocytes, decreasing fat mass. Furthermore, the reduction of alcohol contributed to fat loss by decreasing the intake of excess calories often associated with alcoholic beverages. Simultaneously, improved motility by increasing intake of non-processed fibrous food facilitates the elimination of toxins and waste products stored in adipocyte cells, promoting overall detoxification and metabolic efficiency. Additionally, reducing HDL levels during the weight loss may have facilitated the diminishment of excess inflammation by eating cardiovascular-lipid fighting specific food items found in the PD. The PDs influence on these mechanisms assists in mitigating the symptoms contributing to physical stress while diminishing cellular oxidative stress. These findings suggest that the PD and its influence on weight loss positively impacted this 'clients' condition, mitigating effects on endocrine signaling, immune system regulation, and adipose tissue dynamics. Thereby, aiding in the alleviation of gastrointestinal and neurological symptoms to improve quality of life, halting the progression of HT, and reducing it's impact on metabolic homeostasis.

CONCLUSION

This case highlights remarkable improvements in thyroid biomarkers over 60 days in a client utilizing a PD dietary protocol. The PD is a dynamic dietary protocol that can be personalized to patient needs, while still meeting requirements as an ancestral dietary regime. This case study reports no adverse events and shows positive outcomes. Therefore, the PD may be a safe and effective protocol for HT. Given the current case combined with our current knowledge of stress and its influence on immune-endocrine mechanisms, future research should be performed on larger, more diverse populations to develop population-based clinical practice guidelines to evaluate the overall feasibility of compliance and practice aspects of implementing these diets in a clinical setting. The PD has a potential to transform the management of HT. It is our hope that this case study contributes to a larger conversation and exploration of dietary interventions as an approach to traditional conventional treatments.

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CONTRIBUTORS

J.B. Hollywood conducted the initial proposal of the case report and acquisition of the data. M. Whitfield performed practice visits, data analysis, and literature reviews. M. Whitfield and J.B. Hollywood wrote the manuscript. J.B. Hollywood prepared materials, created figures, and designed tables. A. Keister edited the manuscript. All authors approved this manuscript.

CONFLICTS OF INTEREST

There is one conflict of interest. The client is also an author of the manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

IRB approval is not required for case reports; a signed informed consent is on file with the author.

AVAILABILITY OF DATA MATERIALS

Data materials are available upon request.

FUNDING

None declared.

CONSENT FOR PUBLICATION

The authors approved the final case report and agreed to be accountable for all aspects of the work. Signed informed consent for publication is on file with the author.

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