

Case Report

A Dietary Approach in the Management of Primary Hypothyroidism - A Case Report

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ABSTRACT

Hypothyroidism is a common endocrine disorder characterized by thyroid hormone deficiencies, with primary and secondary types. Primary hypothyroidism is caused by elevated anterior pituitary synthesis of TSH due to inadequate thyroid production. Diet therapy is a practical approach to treating or preventing diseases, with a balanced diet crucial for thyroid function. Nutritional imbalances can lead to thyroid dysfunction. In addition, iodine, selenium, iron, vitamin D, and vitamin B12 are required for thyroid hormone production. This study evaluates diet therapy's effectiveness in managing primary hypothyroidism. A 42-year-old female patient with hypothyroidism reported chest tightness, dizziness, and abdominal burning. She has been experiencing weight gain, body pain, and weakness for two months. She was prescribed allopathic medication and started a therapeutic diet for 21 days. The patient was assessed with pre-post of the parameters of body mass index, thyroid profile, and quality of life. The BMI changed from 27 to 23 kg/m², Thyroid profile values T3 from 34.8 to 117.9 ng/dl, T4 from 1.0 to 13.2 ug/dl, TSH from 39.540 to 0.591 uIU/ml, SF-12 from 72 to 98. and she was advised to take regular follow-ups. This study demonstrates how necessary dietary modifications might influence thyroid function.

Key words: diet, nutrition, hypothyroidism, quality of life

Thyroid hormone deficiencies in the form of low thyroxine (T4) and triiodothyronine (T3) are the characteristics of the common endocrine disorder hypothyroidism [1,2]. Primary and secondary hypothyroidism are the two main types of hypothyroidism [3]. Anterior pituitary synthesis of Thyroid-stimulating hormone (TSH) is elevated in primary hypothyroidism due to inadequate thyroid production of T3 and T4. This results in a lack of negative feedback inhibition [4]. Additionally, autoimmune polyendocrinopathy type-1, which is caused by a mutation in the autoimmune regulator (AIRE) gene, might include hypothyroidism [2]. In India, the prevalence of hypothyroidism is 11%, while in the Western population, it ranges from 2% to 4.6% [5]. Diet therapy is the application of nutrition in a practical way to cure or prevent a disease [6]. A well-balanced diet is essential for proper thyroid gland function [7].

Nutritional imbalance can lead to thyroid dysfunction or disorders, such as hypothyroidism and hyperthyroidism, and possibly contribute to autoimmune thyroid diseases and thyroid cancer, though these claims are controversial [8]. Iodine is a crucial nutrient for the synthesis of the thyroid

hormone and is mostly obtained from our diet, other essential nutrients for thyroid hormone formation include selenium, iron, vitamin D, and vitamin B12 [7]. Severe iodine deficiency causes hypothyroidism because, despite an increase in thyroid activity to maximize iodine uptake and recycling in this setting, iodine concentrations are still too low to enable the production of thyroid hormone [8]. Therefore, this study aims to evaluate the effectiveness of diet modifications and their influence on thyroid function in a patient with primary hypothyroidism.

CASE REPORT

In the online consultation system (OCs), a 42-year-old female patient presented with a complaint of chest tightness, dizziness, and a burning sensation in the upper abdominal region for the last week and complained about the recent weight gain and generalized body weakness for two months from the date of visit. She was diagnosed with hypothyroidism on 21 June 2024 after the thyroid profile results and expert opinion. The patient was under regular allopathic medication during dietary management. Her investigation (thyroid profile) reported increased TSH levels and decreased T3 and T4 levels. The patient was educated on the nature of the disease and advised on dietary management by an expert

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Naturopathy physician. The diet was started on 28 June 2024 and followed for 21 days (details provided in Table 1), which the patient followed strictly throughout the timeline of the intervention.

The patient was assessed with pre-post of the parameters of body mass index, thyroid profile, and quality of life. **The body mass index (BMI)** is the metric currently in use for defining anthropometric height/weight characteristics in adults and for classifying (categorizing) them into groups. The common interpretation is that it represents an index of an individual’s fitness. It is also widely used as a risk factor for the development of or the prevalence of several health issues [9]. **Quality of Life (QOL)** is assessed with the Short Form 12-item Survey (SF-12), which is a common patient-reported instrument to measure physical and mental health-related quality of life. Higher scores for both physical and mental health states indicate greater outcomes. SF-12 scores range

from 0 to 100 [10].

Thyroid function tests aim to distinguish hyperthyroidism and hypothyroidism from the euthyroid state. To accomplish this task, direct measurements of the serum concentrations of the two thyroid hormones—triiodothyronine (T3) and tetraiodothyronine (T4)—more commonly known as thyroxine—are widely used. Direct measurement of serum thyroid stimulating hormone (TSH) concentrations has been widely used to diagnose primary hypothyroidism and, more recently, hyperthyroidism [11]. The patient experienced a noticeable improvement in her physical health and relief from this condition after adhering to the diet recommendations. **The BMI** changed from 27 to 23 kg/m², **Thyroid profile** values T3 from 34.8 to 117.9 ng/dl, T4 from 1.0 to 13.2 ug/dl, TSH from 39.540 to 0.591 uIU/ml, SF 12 from 72 to 98. and she was advised to take regular follow-ups. (pre-post values, represented in Table 2).

Table 1: Details of the interventions

Timings	Food Items	Quantity	Servings/day
6:30am	Coriander seed tea- every morning - one week	50ml	1
8:30am	Green gram sprouts- twice a week Brown aval upma- once a week Foxtail millet dosa + coriander chutney - twice a week Pearl millet dosa + tomato chutney- twice a week	150g	1
11:30am	Amla juice- twice a week Ash gourd juice- once a week Tender coconut water - twice a week Carrot juice- twice a week	200ml	1
12:30pm	Barnyard millet pulavu + coriander chutney- twice a week Black rice porridge + mint chutney- twice a week Fenugreek leaves pulavu + garlic chutney- thrice a week	200g	1
4:30pm	Ginger tea- twice a week Hibiscus tea- thrice a week Cinnamon tea- thrice a week	50ml	1
8:30pm	Fruit salad – apple + papaya + guava + watermelon (mixer of any 2 fruits) - daily night - one week	150g	1
9:30pm	Nuts – almond + dry grapes (2 pieces)	10g	1

Table 2: Baseline and post-assessment of the patient

Parameters	Pre(27 ^h June)	Post(27 th July)
Height(cm)	147	147
Weight (Kg)	58	51
BMI (kg/m ²)	27	23
Serum Thyroid profile	T3 - 34.8 ng/dl T4 – 1.0 ug/dl TSH – 39.540 uIU/ml	T3- 117.9 ng/dl T4 – 13.2 ug/dl TSH – 0.591 uIU/ml
SF -12	72	98

DISCUSSION

The present study demonstrated the role of a therapeutic diet in the management of primary hypothyroidism. Iodine and selenium are essential nutrients for thyroid function, while vitamins A, E, D, and B regulate thyroid function. Vitamin deficiencies in patients with thyroid disease are common. Vitamin B12, also known as cobalamin, is crucial for hematopoiesis and enzymes such as methylmalonyl-coenzyme. The causes of vitamin B12 deficiency in thyroid disease patients may be multifactorial but are primarily related to autoimmune disorders and dietary habits. Vitamin B12 deficiency may be a result of other autoimmune disorders [12]. Iron deficiency is linked to hypothyroidism, likely due to impaired biosynthesis of the haemoprotein thyroid peroxidase (TPO). This disrupts the central feedback regulation of the HPTP axis, increasing iron levels in the blood and necessitating the chelation of liberated Fe.

Several patients develop subclinical hypothyroidism, highlighting the importance of proper iron metabolism and dietary intake in maintaining healthy thyroid function [13]. Also, iron deficiency affects thyroid gland function and the thyroid peroxidase enzyme. Low serum ferritin levels can impair thyroid gland function, lowering inflammatory mediators like IL-1, IL-17, and TNF-alpha. Restoring normal levels of T3 and T4 and reducing TSH levels can help restore thyroid function [14]. The iodine enters the follicular cell, is oxidized to iodine by thyroid peroxidase, and is organized by attaching to tyrosine residues on thyroglobulin, forming T3 and T4 [15]. Fruits and vegetables are essential for healthy dietary patterns due to their fibre, carotene, folate, polyphenols, and vitamins B, C, and E, which play antioxidative, anti-inflammatory, and immunomodulatory roles. Dried fruits like apples and grapes have beneficial effects, while gallic acid decreases IL-6 gene expression and prevents thyroid disease.

Phytochemicals found in whole grains, fruits, vegetables, nuts, and herbs include carotenoids, polyphenols, isoprenoids, phytosterols, saponins, dietary fibers, and certain polysaccharides. These compounds have antioxidant properties, antimicrobial, antidiarrheal, anthelmintic, antiallergic, antispasmodic, and antiviral properties, regulate gene transcription, enhance immunity, and protect against lung and prostate cancers [16]. These are possible effects that could have helped elevate the symptoms of primary hypothyroidism. The limitation of this study shows that further well-planned studies with large sample sizes are required to validate our results since this is a single case study, and the patient was under medication. The strength of the study shows there were no side effects or difficulties found with the patient during diet follow-up, and medicines were stopped by consulting the expert opinion.

CONCLUSION

This study has shown that changes in dietary modifications can correct thyroid functions due to the inclusion of required

nutrients, and the other comorbidities that arose also got corrected. This study shows there are changes in the thyroid hormones (T3 and T4) and TSH. Along with medication support, lifestyle changes, and dietary corrections, the thyroid can be regulated faster. Since this is a single case study, further studies with larger sample sizes and randomization may be warranted.

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