

# Herbal Treatments for Hypothyroidism: An Evidence-Based Review

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## ABSTRACT

**Purpose:** This review aims to provide a comprehensive overview of the current state of research on herbal treatments for hypothyroidism, a condition characterized by a deficiency of thyroid hormones. It seeks to highlight the potential of herbal medicines as a natural alternative to conventional treatments and to identify gaps in current research.

**Methods:** The review involves a thorough examination of existing literature on herbal remedies for hypothyroidism, including an analysis of clinical trials and studies on the efficacy and safety of these treatments.

**Results:** The findings suggest that certain herbal medicines show promise in improving thyroid function tests, though the current evidence is limited by the scarcity of large-scale, high-quality clinical trials. Despite these limitations, some herbal remedies have been found to positively impact thyroid hormone levels and alleviate symptoms associated with hypothyroidism.

**Conclusion:** The review concludes that while herbal medicines offer potential benefits for treating hypothyroidism, further rigorous research is necessary to validate their efficacy and safety. It emphasizes the need for large-scale randomized controlled trials to explore the mechanisms of action and interactions with conventional treatments, ultimately contributing to the development of safer and more effective treatment options.

**Keywords:** Hypothyroidism; Thyroid-stimulating hormone; Thyroid hormones

## INTRODUCTION

Hypothyroidism is a major public health issue in the United States, affecting a substantial portion of the population. The prevalence of hypothyroidism in the USA is around 4.6%, with 4.3% attributed to subclinical hypothyroidism and 0.3% to overt hypothyroidism [1]. The prevalence of overt and subclinical hypothyroidism in the USA is reported to be 0.4% and 9%, respectively [2]. Recent studies have shown that the prevalence of hypothyroidism has increased markedly over the past two decades, with almost 10% of the US population affected between 2009-2012, and this percentage increasing to 11.7% by 2019 [3]. This increase is particularly notable among females and those older than 60 years of age [3].

Hypothyroidism is caused by a deficiency of thyroid hormones due to various factors. The most common cause in iodine-sufficient areas is Hashimoto's thyroiditis, an autoimmune

condition [4,5]. In iodine-deficient regions, the primary cause is iodine deficiency [6,7]. Other causes include autoimmune thyroiditis, thyroidectomy, thyroid ablation, and certain medications [8]. Environmental factors such as thyroid-disrupting chemicals, iodine supply variations, and drugs interfering with thyroid function also contribute to hypothyroidism [9]. Additionally, autoimmune thyroiditis, iodine deficiency, radioiodine ablation, and surgery are significant causes in the elderly population [10].

The current standard treatment for hypothyroidism involves the use of synthetic thyroid hormones, such as levothyroxine. While effective, these treatments can have side effects and are dependent on a stable supply chain. This has led to an interest in exploring alternative treatments, including herbal medicines, which may offer a more natural and potentially safer approach to managing hypothyroidism. Herbal medicines have shown

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**Received:** 28-Sep-2025, Manuscript No. JTDT-25-38794; **Editor assigned:** 30-Sep-2025, PreQC No. JTDT-25-38794 (PQ); **Reviewed:** 14-Oct-2025, QC No. JTDT-25-38794; **Revised:** 30-Oct-2025, Manuscript No. JTDT-25-38794 (R); **Published:** 06-Nov-2025, DOI: 10.35841/2167-7948.25.S1.001

**Citation:** Santiago JB, Martinez F, Durzynski N, Varon J, Halma M (2025) Herbal Treatments for Hypothyroidism: An Evidence-Based Review. *Thyroid Disorders Ther.* S1:001.

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promise in improving thyroid function and normalizing thyroid hormone levels.

Despite the promising potential of these herbal medicines, there are limitations to their current use. The lack of large-scale, high-quality clinical trials and concerns regarding long-term safety and efficacy need to be addressed through rigorous research. Future studies should focus on validating the benefits and safety of these herbal medicines and exploring their mechanisms of action in greater detail. By addressing these gaps in knowledge, we can better incorporate herbal medicines into treatment protocols, offering patients a natural and potentially safer alternative for managing hypothyroidism.

This review aims to provide a thorough overview of the current state of research on herbal medicines for treating hypothyroidism, discussing their potential benefits, limitations, and future directions. By examining the evidence and identifying areas for further research, we hope to contribute to the development of more effective and safer treatment options for patients with hypothyroidism.

## MATERIALS AND METHODS

### Herbal treatment for hypothyroidism

Hypothyroidism results from a deficiency of thyroid hormones due to various factors. Iodine is a significant factor [6,7], though autoimmune conditions can also be causal [4,5]. Environmental factors such as thyroid-disrupting chemicals, iodine supply variations, and drugs interfering with thyroid function also contribute to hypothyroidism [9,10].

Normal thyroid function depends on a variety of trace elements for thyroid hormone synthesis and metabolism, which interact with each other and are in a dynamic balance [11]. Thyroid hormones are known for controlling the metabolism of lipids, carbohydrates, proteins, minerals, and electrolytes, and for regulating body temperature. Normal thyroid status depends on the chemical/elemental composition of body fluids and tissues, which changes depending on physiological state, lifestyle, and environment [12].

### Biomarkers for diagnosing hypothyroidism

Hypothyroidism is primarily diagnosed through the measurement of thyroid hormones and Thyroid-Stimulating Hormone (TSH). The most common biomarkers include serum levels of T3, T4, and TSH. In primary hypothyroidism, there is a reduction in T4 and T3 with a corresponding increase in serum TSH [13]. These biomarkers are essential for confirming the diagnosis and guiding treatment. The measurement of serum TSH levels is the most common method for determining thyroid hormone status. Elevated TSH levels indicate hypothyroidism, while low levels suggest hyperthyroidism. Direct tests include measuring T3, T4, free-T4, free-T3, T4 resin uptake, free T4 index, T4 binding globulin, and anti-TPO [13]. These tests provide a thorough assessment of thyroid function and help in diagnosing hypothyroidism accurately. This review, for the sake of brevity, focuses on interventions which have been tested for their impact on TSH.

## Methods

Our inclusion criteria are

- Published journal article
- Human trial for treating hypothyroidism
- Use TSH as an outcome variable

We search PubMed for “Nutraceuticals” and “Hypothyroidism” and extract 59 suitable articles. From here, we search the main text of the article for the impact on TSH.

We extract the population intervention, comparator and outcomes from the study (Supplementary Table 1) and perform a risk of bias assessment using the Cochrane ROB2 criteria (Supplementary Table 2) [14].

## RESULTS AND DISCUSSION

### Interventions for hypothyroidism

Several herbal and nutraceutical interventions have been tested for their impact on hypothyroidism (Supplementary Tables 1 and 2). Five studies showed low risk of bias (Supplementary Table 2) with reasonable sample size (Supplementary Table 1) [15-19].

The interventions studied were Desiccated Thyroid Extract (DTE) [15], iodine [16], *Nigella sativa* [17], L-carnitine [18], and ashwagandha [19]. These findings suggest possible clinical utility for ginger in treating hypothyroidism.

### Desiccated Thyroid Extract (DTE)

The study included 70 patients (mostly women, average age around 51) with primary hypo who were stable on L-T4 for at least six months. They randomized them to either DTE or L-T4 for 16 weeks, then crossed over to the other for another 16. Doses were adjusted to keep TSH between 0.5-3.0  $\mu$ IU/mL, which is key for euthyroid status. They measured thyroid labs like TSH, total T3, total T4, free T4, reverse T3 (rT3), and SHBG, plus symptoms *via* questionnaires (GHQ-12 for general health, TSQ for thyroid symptoms), neurocog tests (Wechsler Memory Scale), and patient preference at the end.

On the thyroid effects side DTE showed some distinct biochemical changes compared to L-T4. Patients on DTE had higher total T3 levels (139 ng/dL *vs.* 89 ng/dL,  $P < .0001$ ), which makes sense since DTE contains both T4 and T3 from porcine thyroid. But their total T4 and free T4 dropped significantly (total T4: 5.9  $\mu$ g/dL *vs.* 9.3  $\mu$ g/dL; free T4: 0.85 ng/dL *vs.* 1.36 ng/dL) [15].

### Iodine

The study recruited 112 adults (aged 18-40, mostly women) who were mildly iodine deficient based on median Urinary Iodine Concentration (UIC) of 65  $\mu$ g/L from five spot urines. They excluded folks with thyroid antibodies (TPOAb or TgAb) to avoid confounding Tg levels. Participants got randomized to 150  $\mu$ g/d iodine (as potassium iodate) or placebo for 24 weeks. Blood was drawn at baseline, 8, 16, and 24 weeks for Tg, TSH, FT4; UIC from pooled urines at baseline and end.

On the thyroid effects iodine supplementation bumped UIC from 69 µg/L to 168 µg/L in the treated group ( $P<.001$  vs. placebo, which went from 64 to 79 µg/L still deficient). Tg dropped significantly in the iodine group: Median from 19.5 µg/L at baseline to 13.0 µg/L at 24 weeks, a 27% reduction compared to placebo ( $P<.001$ ). At 8 and 16 weeks, it was down 12% and 20% respectively ( $P=.045$  and  $P<.001$ ). Proportion with  $Tg>40$  µg/L fell from 7.1% to 1.8% in treated vs. steady in placebo. TSH and FT4 stayed normal and unchanged in both groups (TSH ~1.8 mU/L, FT4 ~16 pmol/L at end-no sig diffs)[16].

This suggests iodine repletion reduces thyroid stimulation (lower Tg as a marker of hyperplasia or whatever), without messing with TSH/FT4 since mild deficiency doesn't push them out of range. Authors propose  $Tg<13$  µg/L as a cutoff for adequate iodine in adults, like in kids per WHO. No adverse effects reported, and compliance was good (~90%) [16].

### *Nigella sativa*

Hashimoto's Thyroiditis (HT) is an autoimmune thyroid disorder primarily managed with levothyroxine, but novel adjunct therapies are under investigation. This 8-week randomized, double-blind, placebo-controlled trial evaluated the effects of *Nigella sativa* (2 g/day) in 40 patients with HT. Twenty participants per group completed the study.

*Nigella sativa* was generally well tolerated, with mild itching and nausea in three cases. Compared with placebo, supplementation significantly reduced body weight, BMI, waist, and hip circumference ( $p<0.05$ ). Thyroid function improved with lower serum TSH and anti-TPO antibody levels and higher T3 concentrations ( $p<0.05$ ). Serum VEGF decreased significantly ( $p=0.02$ ), while Nesfatin-1 levels did not change. However, regression analysis showed that changes in waist-to-hip ratio, TSH, and T3 were significant predictors of Nesfatin-1 variation. These findings demonstrate beneficial effects of *Nigella sativa* in improving thyroid status, reducing VEGF, and aiding weight control in HT patients, supporting its potential role as an adjunctive therapy [17].

### L-carnitine

Primary hypothyroidism is a common disorder with a prevalence of 0.3–5.0%. Despite adequate levothyroxine replacement, many patients continue to experience persistent fatigue and related symptoms, suggesting that thyroid hormone therapy alone may not fully address energy metabolism. Carnitine plays a central role in mitochondrial fatty acid transport and oxidation, and thyroid hormone influences its urinary excretion and bioavailability. A relative carnitine deficiency has been hypothesized to contribute to ongoing fatigue in treated hypothyroid patients, making supplementation a potential therapeutic strategy [18].

This 12-week randomized, double-blind, placebo-controlled trial evaluated L-carnitine (1,980 mg/day) in 60 hypothyroid patients with persistent fatigue despite levothyroxine. L-carnitine significantly increased serum carnitine levels and improved fatigue scores: 75% (FSS), 53.6% (PFS), and 50% (MFS) versus

20%, 24%, and 24% with placebo (all  $p<0.05$ ). Subgroup analyses showed greater benefits in patients <50 years, with free T3  $\geq 4.0$  pg/mL, higher baseline carnitine, or post-thyroidectomy hypothyroidism. Adverse events occurred equally in both groups (33.3%). L-carnitine effectively alleviated fatigue and was well tolerated [18].

### Ashwagandha

Ashwagandha (*Withania somnifera*) is an adaptogenic herb known for its potential role in modulating thyroid function through various physiological mechanisms [20]. Its bioactive compounds, including withanolides, alkaloids, and saponins, contribute to its therapeutic effects. Withanolides exhibit anti-inflammatory and antioxidant properties, alkaloids provide neuroprotective effects, and saponins enhance Ashwagandha's adaptogenic properties, helping the body cope with physiological stress [21]. Given these properties, Ashwagandha has been increasingly studied for its ability to support thyroid regulation.

Ashwagandha influences thyroid function through multiple pathways. Research suggests that it can stimulate the secretion of thyroid hormones, increasing T3 and T4 levels [21]. Additionally, its adaptogenic effect reduces cortisol, mitigating stress-induced suppression of thyroid function. Its strong antioxidant profile also helps protect thyroid cells from oxidative damage [21]. A randomized, double-blind, placebo-controlled trial by Sharma et al. found that daily supplementation of 600 mg of Ashwagandha for eight weeks resulted in a 41.5% increase in T3, a 16% increase in T4, and a significant reduction in TSH ( $p<0.001$ ), with minimal transient adverse effects [19]. Another 60-day clinical study by Lopresti et al. demonstrated a 23% reduction in morning cortisol levels, improved stress markers, and indirect support for thyroid function [22-26].

## CONCLUSIONS

This work aims to provide guidance for the development of integrative treatments for hypothyroidism. Several herbs and nutraceuticals may be beneficial for cases of hypothyroidism, and we have provided an overview of the current studies on non-pharmaceutical agents for the treatment of hypothyroidism. The most promising agents include selenomethione, shadhashana charna, ginger, and ashwagandha. These agents, as well as the others identified, albeit with lower priority, should be subject to further validation. The treatment of hypothyroidism is a pressing chronic condition for people in developed countries, even with abundant trace minerals (such as iodine) for proper thyroid function.

The above treatments are non-pharmaceutical and may be able to be used as part of an integrative treatment plan, as these approaches are gaining popularity, and may avoid the side effects of pharmaceuticals used for hypothyroidism. Furthermore, for cases of subclinical hypothyroidism, as affects 4.3% of Americans, a lesser degree of intervention can correct thyroid function, and nutraceuticals may be useful in that role.

## CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

## ACKNOWLEDGMENTS

This study was funded by the Independent Medical Alliance, grant number not applicable. A preprint version of this article is online at.

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