

## Herbs Used In Thyroid Disease Management: A Comprehensive Review

Deepak Kumar<sup>1</sup>, Sunil Kumar<sup>2</sup>, K. Prabhu<sup>3</sup>, Ankur Yadav<sup>4</sup>, Pawan Verma<sup>5</sup>,  
Nisha Soni<sup>6</sup> & Pari Gupta<sup>7</sup>

Department of Pharmacy, Nandini Nagar Mahavidyalaya College of Pharmacy, Nawabganj, Gonda, UP, India.

Submitted: 10-01-2024

Accepted: 20-01-2024

### ABSTRACT:

Thyroid diseases, encompassing conditions such as hypothyroidism, hyperthyroidism, and autoimmune thyroid disorders, pose significant challenges to global health. While conventional pharmaceutical interventions are widely employed, there is a growing interest in exploring complementary and alternative therapies, particularly the use of herbs. This abstract reviews the current scientific literature on various herbs utilized in the management of thyroid diseases. The search for effective herbal interventions revolves around substances with purported anti-inflammatory, antioxidant, and adaptogenic properties. Commonly studied herbs include Ashwagandha (*Withaniasomnifera*), Holy Basil (*Ocimum sanctum*), Guggul (*Commiphorawightii*), and Bladderwrack (*Fucusvesiculosus*). These herbs have shown promise in modulating thyroid function, balancing hormone levels, and mitigating symptoms associated with thyroid disorders.

**Key words:** Hypothyroidism, Hyperthyroidism, Iodine, *Cocos Nucifera* & *Ocimum Tenuiflorum*.

### I. INTRODUCTION

Endocrine illnesses are now a more prevalent and complicated global health concern that puts a bigger financial burden on governments worldwide because of its devastating consequences. According to a recent study published in 2020, 10% of people worldwide have diabetes mellitus, 5% have hypothyroidism, 0.2–1.3% have hyperthyroidism, and more than 200 million women have osteoporosis. On the other hand, despite their occasional disdain, endocrine-regulating drugs are a crucial component of prophylactic plans for people with diabetes, thyroid problems, infertility, and disorders affecting the adrenal glands. Experts focus particularly on medicinal plants in addition to the conventional techniques used in this field to produce potent phytomedicine that optimizes therapeutic

outcomes. Consequently, natural goods and nutrition are rapidly becoming the focus of research aims due to the increased interest of academics in these disciplines. This review provides examples of the most effective medicinal plants for treating common endocrine problems, with special attention on green-formulated nanoparticles that show better results than crude extracts. Thyroid hormones are the only known iodine-containing biologically active molecules, and they have two important functions. They have a significant role in controlling the proper development of developing animals and humans, especially in the central nervous system (CNS). Through maintaining metabolic balance, thyroid hormones have an impact on nearly every organ system in an adult. To meet these demands, the thyroid gland produces a large amount of hormone reserves. Although target tissues, such as the brain, may also experience local metabolism, the liver is the primary site of thyroid hormone metabolism. Thyrotropin, a pituitary hormone, accurately controls serum concentrations of thyroid hormones using a traditional negative-feedback mechanism. Thyroid hormones primarily function by binding to nuclear thyroid hormone receptors (TRs) and modifying the transcription of particular genes. Thyroid hormones, like steroid hormones, vitamin D, and retinoid, all have a similar mode of action due to their nuclear receptors, which form a superfamily... Three hormones are secreted by the thyroid gland: calcitonin, triiodothyronine (T3), and thyroxin (T4). While people with clinical thyroid illness have abnormal serum levels of T4, T3, and TSH, subclinical thyroid disease is characterized by abnormal serum levels of TSH but normal levels of T4 and T3. Subclinical thyroid disease does not necessarily require treatment. Autoimmunity, external radiation to the head and neck, a biosynthetic error in iodine organification, tumor replacement of the thyroid gland, and drug use are recognized risk factors for thyroid illness.

Increasing age, female sex, and iodine shortage are other factors linked to an increased risk of thyroid illness.

Thyroid disorders can arise from a little enlargement of the thyroid gland; these disorders do not require treatment, but long-term thyroid cancer does. Thyroid hormone growth abnormalities are the most common cause of thyroid disorders. There are two general classifications for thyroid disorders:

#### A -Hypothyroidism

Thyroid function suppression is known as hypothyroidism. Primary and secondary hypothyroidism are the two subtypes of hypothyroidism. Secondary hypothyroidism is defined as normal pituitary stimulation by hypothalamic TSH-releasing hormone. Primary hypothyroidism is defined as the internal activity of the thyroid gland, resulting in decreased circulation of thyroid hormones or failure to create enough thyroid hormone. The following are the primary causes of hypothyroidism:

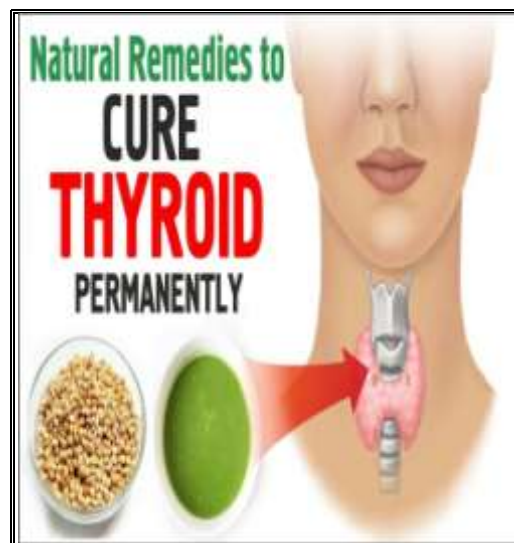
- Inadequate diet rich in iodine.
- Absence of thyroid stimulating hormone (TSH) or hypothalamic TSH-releasing hormone (TRH), or both
- Issues with the thyroid gland.

**Symptoms include:** Mental fog; unexplained or excessive weight gain; constipation; muscle cramps; increased menstrual flow; more frequent periods; infertility/miscarriage; low blood pressure; frequent infections; bloating/puffiness in hands, feet, eye area, face, etc.; fatigue; exhaustion; feeling run down and sluggish; depression; moodiness; difficulty concentrating; brain fog

#### B -Hyperthyroidism

Elevated thyroid function is referred to as hyperthyroidism. The term "hyperthyroidism" describes a condition in which there is an excessive amount of thyroid hormone secreted and synthesized. The most often used term to describe hyperthyroidism is "Graves' disease." An autoimmune ailment is Graves' disease.

**Symptoms include:** Anxiety, agitation, increased sweating, skin thinning, fine, brittle hair, trembling hands, panic attacks, insomnia, racing heart, frequent bowel movements, weight loss despite having a healthy appetite, lighter flow, fewer menstrual periods, and muscular weakness, particularly in the upper arms and thighs.



Source:

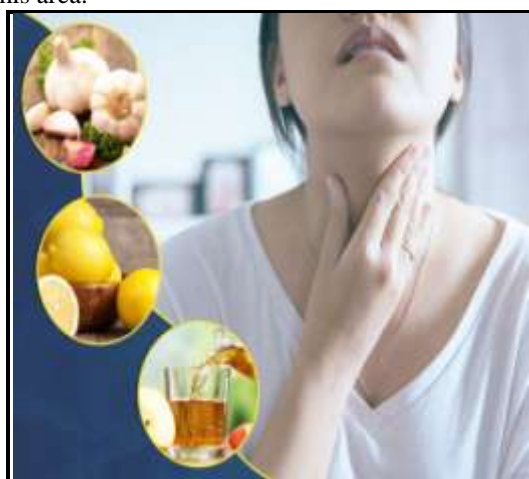
<https://pbs.twimg.com/media/D18LhAJVAAA4JWm.jpg:large>

## II. HOME MEDICATIONS FOR THYROID DISEASE

The definition of complementary and alternative medicine is the area of medicine that is not approved as the usual course of treatment for treating illnesses. As the name suggests, complementary medicine can be used in addition to conventional medical therapy, while alternative medicine can be used in place of the conventional treatment plan, according to the National Institute of Health (NIH). One of the many subcategories of complementary and alternative medical techniques, phytomedicine (also known as herbal medicine) has recently drawn scientific attention because of mounting evidence of its biological efficacy against a variety of illnesses. The necessity for using a herbal medicinal approach to treat thyroid problems arose from the possibility that it would assist manage the negative effects of the already available chemotherapy and other treatment alternatives. It also aids in the disease's recovery when taken either by itself or in conjunction with a regular treatment plan. This method lessens the worry and tension associated with taking medication and any associated side effects. While normal treatment choices are initially required for people diagnosed with thyroid issues, many people do not want to follow through on these treatments for the rest of their lives. As a result, herbal remedies offer an affordable, natural, and low-side effect method of managing the disease. A pharmacological option for controlling

inflammation and autoimmune triggers is provided by the herbal medicinal approach, which stands in stark contrast to synthetic medications and/or thyroid hormone replacement therapy.

The treatment of thyroid dysfunction with a herbal approach entails closely monitoring the lifestyle and environmental factors that contribute to the condition and employing a herbal medication in conjunction with conventional therapies, diet, and nutrient supplementation to combat the illness. We have made an effort to examine the advantages of various herbal remedies for thyroid conditions in this area.



Source:

[https://images.onlymyhealth.com/imported/images/2022/January/28\\_Jan\\_2022/Goiter\\_Large.jpg](https://images.onlymyhealth.com/imported/images/2022/January/28_Jan_2022/Goiter_Large.jpg)

### III. THE IMPACT OF HERBAL PLANTS IN THE THYROID DISEASE

Isoflavonoids from certain plants have a significant impact on thyroid hormones and the hypothalamus-pituitary axis. The soy (*Glycine max*) plant's genistein and daidzein inhibit the enzyme thyroperoxidase, which is responsible for iodination and thyroid hormone production. Pearl millet (*Pennisetum glaucum*) and fonio millet (*Digitaria exilis*) are two other plants that have hypothyroid effects. Thiocyanate is present in tropical plants like cassava, lima beans, linseed, bamboo shoots, and sweet potatoes, as well as Brassicaceae plants like cabbage, cauliflower, kale, rutabaga, and kohlrabi.

Thiocyanate is also found in tobacco smoke. Brassicaceae plants (Family Cruciferae) such as cabbage (*Brassica oleracea*), broccoli, cauliflower, kale, kohlrabi, Brussels sprouts, and rutabaga (swede or yellow turnip, *Brassica napobrassica*), rapeseed, and mustard have long been recognized for their goitrogenic and

antithyroid properties. SCN inhibits the enzyme thyroperoxidase, which stops iodine from being incorporated into thyroglobulin, and interferes with the thyroid's ability to actively absorb and concentrate inorganic iodide. Turnips and rutabagas contain progoitrin, a thiourea-like substance that inhibits thyroperoxidase and is a precursor to goitrin.

The tropics provide a lot of staple foods that are high in cyanogenic glycosides. Among these plants are lima beans (*Phaseolus vulgaris*), millet, yam, sweet potato, cassava (*Manihot esculenta* Crantz), and bamboo shoots. Tobacco smoke (*Nicotiana tabacum*) not only contains flavonoids, hydroxypyridines, and derivatives of resorcinol, but also significant levels of cyanide (150–300 µg per cigarette). Typically, natural flavonoids are polymerized to generate additional flavonoids and non-flavonoids (acyl derivatives) after being conjugated to sugars or carbohydrates (glycosides); the nonconjugated forms of flavonoids are known as aglycones. When infants are given soy-based formulae as a milk substitute, the fast and easy absorption of flavonoid aglycones from intestinal digestion increases the risk of goiter and the development of antithyroid effects. It has been suggested that part of the antithyroid effects of soybeans, which are widely used in China and the Orient, may be mitigated by fermentation.

Apart from the different illnesses and physiological conditions that can throw off the thyroid hormone balance, it's important to emphasize that ongoing exposure to certain environmental factors—like pesticides, herbicides, fungicides, and insecticides—is thought to be a significant risk factor for thyroid disease development. This can be attributed to a number of factors, including endocrine system disruptions, decreased thyroid hormone uptake, interference with thyroid hormone receptors, transport protein blockages, disruptions in the activity of iodothyronine deiodinases, increased thyroid hormone clearance, and decreased thyroid hormone uptake and activity in target cells.

Therefore, in an effort to supplement or replace synthetic drugs, researchers are now paying close attention to phytochemicals that function as natural analogs of thyroid hormone or even as nuclear receptor modulators. For the treatment of thyroid problems, this investigation of agonists, antagonists, ligands, co-repressors, and coactivators components is a prospective target. Furthermore, it has been suggested that, in order to maximize the

therapeutic effects, it be used as a mixture of natural products with pharmaceutical medications. The majority of the information on traditional knowledge on thyroid management that was acquired for this study came from informants who were older than 50. Furthermore, informants with low levels of literacy shared more information than those with high levels of instruction. Overall, it has been reported that 63 different species of medicinal plants are traditionally utilized in Algeria to treat thyroid diseases. 34 families and 59 genera contained the reported plant diversity. The three families with the highest representation were Lamiaceae, Fabaceae, and Apiaceae.

### 3.1 *Withaniasomnifera* (ashwagandha)



Source:-

[https://mangalorespice.com/cdn/shop/products/HR\\_01-02\\_2048x.jpg?v=154065905](https://mangalorespice.com/cdn/shop/products/HR_01-02_2048x.jpg?v=154065905)

Called also as winter cherry or Indian ginseng, ashwagandha is a plant that belongs to the Solanaceae family and is a saponinglycoside. Alkaloids, fatty acids, organic acids, and withanolides are the most active components of ashwagandha. It was discovered that the high concentration of antioxidant components in ashwagandha methanolic extract greatly improved the tissue in hypothyroidism produced by propylthiouracil, increased thyroid hormone levels, and decreased oxidative stress. In comparison to the untreated hypothyroidism rat group, this was demonstrated by a considerable drop in the blood levels of TSH and a rise in T3, free T3, free T4, and total T4 hormones. Furthermore, the rat hypothyroidism group administered with ashwagandha extract showed increased levels of blood haemoglobin, GPx, GSH, and Nap/KI-ATPase and decreased serum concentrations of glucose and Il-6. On the other hand, this herb was also said to help treat hyperthyroidism, which may

point to its thyroid hormone modulating properties. In a Dutch case report, a healthy woman using ashwagandha capsules for exhaustion developed thyrotoxicosis. Her symptoms went away once she stopped taking the capsules.

### 3.2- *Nigella sativa* (black seed)



Source:[https://www.healthaid.co.uk/cdn/shop/articles/Black\\_Seed\\_Oil\\_Nigella\\_Sativa\\_for\\_Gastrointestinal\\_Health.jpg?v=1663280495](https://www.healthaid.co.uk/cdn/shop/articles/Black_Seed_Oil_Nigella_Sativa_for_Gastrointestinal_Health.jpg?v=1663280495)

Because of the primary bioactive component in its essential oil, thymoquinone, *Nigella sativa* is the next most frequently mentioned medicinal plant used as an antihypothyroidism treatment. A recent study on animals suggests that this combination of essential oils could be useful as adjuvant therapy to raise thyroid hormone levels by decreasing oxidative stress because thymoquinone has a strong antioxidant impact. This substance is in charge of bringing the aberrant thyroid hormone levels in models of both hyperthyroidism and hypothyroidism back to normal. In hypothyroidism, it has dramatically increased total antioxidant capacity, decreased nitric oxide, and raised total triiodothyronine (TT3) levels. Conversely, it has decreased TT3 levels in the animal group with hyperthyroidism. Furthermore, a different recent study found that aluminum chloride was responsible for the therapeutic actions of this essential oil against thyroid damage. Treatment with *N. sativa* seed oil has enhanced TT3 levels, the histological characteristics of the thyroid gland damaged by aluminum chloride, and stimulated the regeneration of the epithelial cells surrounding the thyroid gland follicles. Additionally, it was noted that *N. sativa*'s strong antioxidant qualities helped patients with Hashimoto's thyroiditis avoid hypothyroidism when they consumed the plant on a

daily basis. Notably, *Thymus vulgaris* and *Origanum* also contain thymoquinone, the primary bioactive component of *N. sativa*, which has been proposed as a possible treatment for hypothyroidism.

### 3.3- *Cocos nucifera* (Coconut oil)



Source: <https://www.jindeal.com/wp-content/uploads/2020/01/vedini-coconut-oil-extra-virgin.jpg>

According to preliminary research, lipids like avocado oil and coconut oil help the thyroid function by presumably triggering the thyroid hormone in the body. There have been reports of goiter improvement and decrease. Pennell's *Bacopamonnieri* (L.) *B. monnieri*, also known as Chhotibrahmi or Jal-Neem locally, belongs to the Scrophulariaceae family. If *B. monnieri* is taken in half a glass twice a day for seven to ten days, it has been found to treat hypothyroidism. When the thyroid is underactive, this tonic medicinal herb is utilized. Based on preliminary research, *B. monnieri* elevates T4 levels but has no effect on T3.

### 3.4- *Fucusvesiculosus* (Bladder wracks)



Source: <https://i.ytimg.com/vi/NxxhWiYKxP0/maxresdefault.jpg>

Bladder wrack is a unique kind of algae that has the advantageous property of being utilized to treat antithyroid disorders, including hyperthyroidism and hypothyroidism. Bladder wrack is a member of the Fucaceae family since it is derived from algae rather than any plant material. Traditionally, bladder wrack has been used to treat thyroid function in a variety of diseases, including hyperactivity, normalcy, and underactivity. Seaweeds include bladder wrack, and the amount of iodine in each type varies. Iodine content of dried bladder wrack is around 50 mg. Iodine aids in thyroid gland stimulation. It has substances that lessen the size of thyroid goiters and aid in the thyroid gland's return to normal function. In cases where iodine levels are low, it is imperative to consume iodine as it might lead to hyperthyroidism and other adverse effects. It has anti-inflammatory, anti-obesity, antioxidant, and anticarcinogenic qualities. It also contains an L-fucose molecule and iodine. *F. vesiculosus* is bioavailable and a significant source of iodine. It is also high in minerals, including magnesium, calcium, potassium, and relatively little phosphorus, selenium, and phosphorus. Additionally, it has sufficient levels of vitamins A, D, E, K, B2, B3, and B6. All of these vitamins and minerals are present in *F. vesiculosus*, which also helps lower blood levels of trans-sialidase activity and regulates thyroid function. One enzyme linked to the buildup of cholesterol is trans-sialidase. Given that hyperlipidemia is linked to decreased metabolism, this may be beneficial for individuals with hypothyroidism.

### 3.5- *Melissa officinalis* (lemon balm)



Source: <https://urbantilth.org/wp-content/uploads/2021/03/lemonbalm-scaled.jpeg>

Family: Lamiaceae

Lemon balm works by influencing both the hormone and the receptor, as shown in previous research, to effectively prevent TSH from attaching to the receptor. Moreover, it suppresses the cyclic AMP synthesis that TSH receptor antibodies induce. Lemon balm has long been used to treat hyperthyroidism symptoms like tachycardia, sleeplessness, and hyperactivity.

### 3.6-*Convolvulus pluricaulis* Choisy (Shankpushpi)



Source :<https://www.101herbs.com/images/probody-img/convolvulus-pluricaulis.jpg>

Family: Convolvulaceae

*Convolvulus pluricaulis* helps alleviate the symptoms of hyperthyroidism by exerting a considerable influence on a few liver enzymes. It is beneficial in reducing hyperthyroidism symptoms and possesses antiulcer qualities. Additional research on *C. pluricaulis* suggests that it may be helpful in treating hypothyroidism.

### 3.7-*Lithospermum officinale* (European stoneseed)



Source:[https://wildflowersearchv11.appspot.com/storage.googleapis.com/img/Lithospermum\\_officinale.jpg](https://wildflowersearchv11.appspot.com/storage.googleapis.com/img/Lithospermum_officinale.jpg)

Family: Boraginaceae

The hypothalamus pituitary thyroid axis is influenced by club moss. It has the ability to prevent peripheral T4 deiodination, which activates T3. Previous research analyzing herbal combinations suggests that club moss could function as a TSH receptor blocker.

### 3.8-*Commiphora mukul* (Guggul)

Guggul extract contains oleo-resin from the *Commiphora mukul* tree. Oleo-resin of guggul contains Z-guggulsterone, a powerful thyroid stimulating agent. Furthermore, through improving the conversion of T4 to T3, raising T3 levels, and inducing hepatic lipid peroxidation, guggulsterone promotes the synthesis of T3. Elevations of T3 have been shown to reduce low-density lipoprotein cholesterol in hypothyroid individuals. One can support someone who is losing weight. In India, guggul is a conventional Ayurvedic medication used as a thyroid stimulant. As a result, it causes the thyroid gland to manufacture thyroid hormones directly.

### 3.9- *Rosmarinus officinalis* (Rose marry)

Rosemary belongs to the Lamiaceae family of plants. It has a significant concentration of rosmarinic acid, which is used to treat hyperthyroidism. The rosemary herb functions similarly to the lemon balm since studies have shown that rosmarinic acid inhibits immunoglobulin's effects on the TSH receptor, acts on the receptor site itself, and reduces peripheral conversion of T3. Treatment for Grave's diseases may also benefit from rosmarinic acid.

### 3.10-*Leonurus cardiac* (Motherwort)

Previous research has shown that motherwort is primarily utilized in combination with other plants. Motherwort's anti-inflammatory properties are mostly attributed to the flavonoid quercetin that it contains. Motherwort is a good option for treating hyperthyroidism because it reduces inflammation and swelling, which is important in the treatment of autoimmune illnesses. In this instance, in addition to decreasing inflammation, the enzyme 5 deiodanase is inhibited. Traditionally, motherwort has been used to alleviate tachycardia, palpitations, and anxiety symptoms.

### 3.11- *Centella asiatica* (Gotu Kola)

The leaf of gotu kola is often used to treat hypothyroidism. It contains brahmic acid, also

known as madecassic acid, as well as asiatic acid, asiaticoside, and brahmoside. It is more likely that gotu kola has the ability to increase T4 synthesis. It is also utilized to improve energy and vigor by regulating the neurological system. The energizing action of these herbs helps to improve or promote the production of T4. Gotu leaf tincture is mostly used to treat hypothyroidism.

### 3.12- Bacopamonnieri( water hyssop)

Although bacopa is primarily recognized for its positive effects on mood and mental clarity, an animal study also showed that bacopa enhanced the synthesis of thyroid hormone. High-dosage bacopa extracts stimulated the thyroid gland and reduced symptoms by increasing both T3 and T4, which were comparable to levothyroxine.

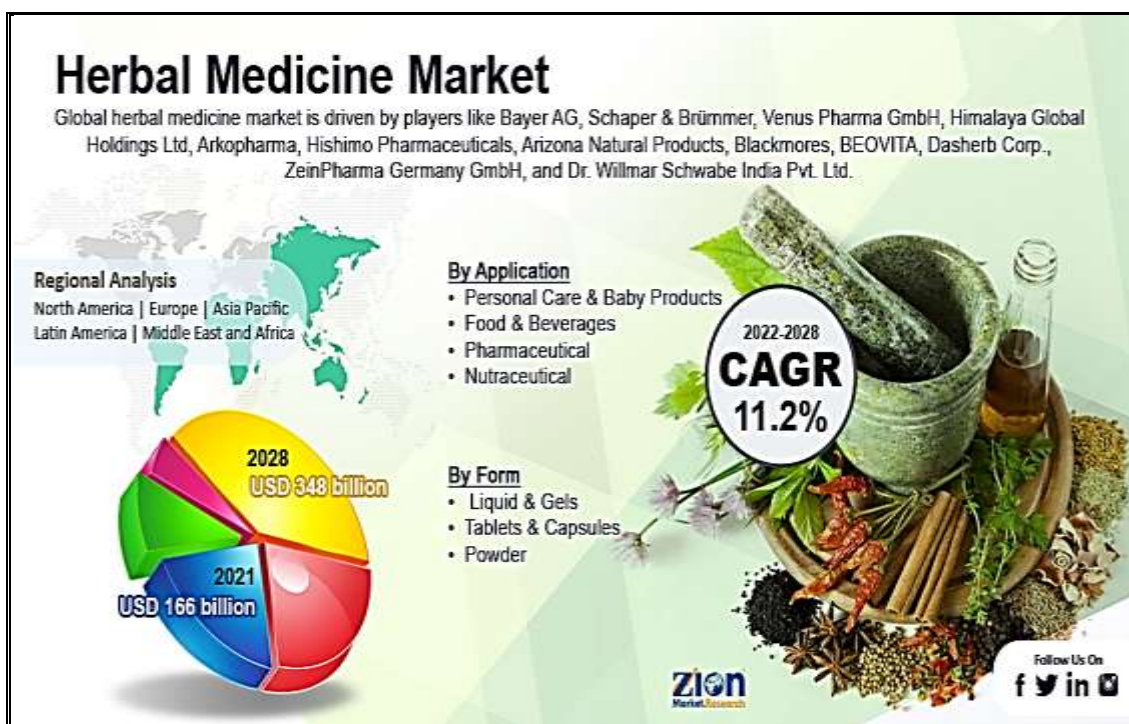
### 3.13- Ocimumtenuiflorum (Holy Basil)

Known by another name, tulsi, this herb was revered by Indian aristocracy and frequently appeared in Hindu legend. These days, research has demonstrated the herb's ability to harmonize the mind, body, and soul. Holy basil, a member of the mint family, is well-known in natural medicine as an adaptogenic herb. Prolonged stress can result in elevated cortisol levels, which can lead to various

issues, such as thyroid malfunction. Holy basil improves your body's ability to handle stress.

## IV. ASPECTS IN FUTURE

There is still a pressing need to evaluate WBCs (to understand blood cell profile) before to beginning treatment because the best illness management strategy depends on a variety of factors, including age, clinical history, disease severity, etc. Future success in developing a personalized treatment plan will depend on closely observing and adjusting the medicine dosage. This will open the door to more effective disease treatment strategies with fewer adverse medication reactions that are also safe and effective. Furthermore, the requirement for customized drug dosages to achieve improved therapeutic efficacies is highlighted by the participants' diverse immunological and genetic makeup. Additionally, this will assist lower the rates of disease remission and inter-individual variability in drug tolerance. Furthermore, the most recent developments in the fields of genomes, proteomics, and metabolomics can aid scientists in their quest for a deeper understanding of disease intervention techniques.



Source: <https://www.zionmarketresearch.com/content/uploadedimages/global-herbal-medicine-market.png>

## V. CONCLUSION

The review led to the development of some fascinating facts. The diversity of plants' intriguing displays piques people's curiosity regarding their plant profiles, phytochemical activities, and spectrum of medicinal actions. Other than the decreased cytotoxicity and side effects of the conventional medicines, the quest for novel plant-derived treatments has been observed to offer comparable, and occasionally greater, pharmacological effects. Nevertheless, several plant extracts or the separated secondary metabolites from them were useful in preventing or slowing the progression of certain illnesses. The pharmacological effects of these medicinal plants on diabetes mellitus type 1 and type 2, insulin resistance, hyper- and hypogonadism, polycystic ovarian syndrome, dysmenorrhea, male and female fertility, and hyper- or hypothyroidism are shown to be numerous. Not all of the listed medicinal plants have been the subject of in vivo or clinical research, as far as we know. Further investigation into the impacts of these plants and other species belonging to the same genera, which may have more potent or similar actions, is therefore necessary. Additionally, we looked at a few isolated natural compounds and extracts made using nanotechnology that have been known to treat the conditions under discussion as well as other illnesses.

## REFERENCES:

- [1]. Singh, B., Sundar, S., & Shukla, A. (2021). Herbal Medicines for Thyroid Diseases. In *Treating Endocrine and Metabolic Disorders With Herbal Medicines* (pp. 256-277). IGI Global.
- [2]. Gupta, G., Wamankar, S., Gidwani, B., & Kaur, C. D. (2016). Herbal Drugs For Thyroid Treatment. *International journal of pharmacy and biological sciences*, 6, 62-70.
- [3]. Al Zarzour, R. H., Kamarulzaman, E. E., Saqallah, F. G., Zakaria, F., Asif, M., & Razak, K. N. A. (2022). Medicinal plants' proposed nanocomposites for the management of endocrine disorders. *Heliyon*.
- [4]. Yarnell, E., & Abascal, K. (2006). Botanical medicine for thyroid regulation. *Alternative & Complementary therapies*, 12(3), 107-112.
- [5]. Nagarathna, P. K. M., & Jha, D. K. (2013). Study on antithyroid property of some herbal plants. *Int. J. Pharm. Sci. Rev. Res*, 23(2), 203-211.
- [6]. Bharthi, V., Kavya, N., Shubhashree, M. N., & Bhat, S. (2017). Herbal approach to management of thyroid disease-a review. *Journal of Ayurvedic and Herbal Medicine*, 3(1), 48-52.
- [7]. Azari, Z., JalaliKondori, B., & Asadi, M. H. (2019). Effect of Medicinal Herbs in the Treatment of Thyroid Malignancy. *Anatomical Sciences Journal*, 16(2), 65-76.
- [8]. Rafieian-Kopaei, M. (2018). Thyroid diseases: Pathophysiology and new hopes in treatment with medicinal plants and natural antioxidants. *International Journal of Green Pharmacy (IJGP)*, 12(03).
- [9]. Taïbi, K., AitAbderrahim, L., Helal, F., & Hadji, K. Ethnopharmacological study of herbal remedies used for the management of thyroid disorders in Algeria. *Saudi Pharm J*. 2021; 29 (1): 43–52.
- [10]. Brown R and Francis G.L ; Autoimmune Thyroid Disorders ; *Journal of Thyroid Research* ;year 2011; page 1-2
- [11]. Garg S.C ; Essential oils as therapeutics ; *Natural product Radiance* ; year 2005; volume 4(1) ; page no. 18-26
- [12]. Garg S.C ; Essential oils as therapeutics ; *Natural product Radiance* ; year 2005; volume 4(1) ; page no. 18-26
- [13]. Mary Bove ; *Botanical Insights into Autoimmune Thyroid Disease* ; copyright 2012 *Diversified Business Communications* ; page no-1-9
- [14]. Van der Hoof CS, Hoekstra A, Winter A, et al. Thyrotoxicosis following the use of ashwagandha [in dutch], *Nederlands Tijdschrift voor Geneeskunde* 2005;149:2637-2638.
- [15]. Goodman & Gilman, *Pharmacologic Basis of Therapeutics Chapter 56. Thyroid and Antithyroid Drugs - 11th Ed*, 2006.
- [16]. Baskin HJ, Cobin RH, Duick DS. American Association of Clinical Endocrinologists medical guidelines for clinical practice for the evaluation and treatment of hyperthyroidism and hypothyroidism. *Endocr Pract*, 8(6), 2002, 457–469.
- [17]. Delange F. Endemic cretinism. In: Braverman L, Utiger R, eds. *The Thyroid*.





- 8th ed. Philadelphia, PA: Lippincott Williams & Wilkins, 2000, 743–754.
- [18]. Singer P. Primary hypothyroidism due to other causes. In: Braverman L, Utiger R, eds. *The Thyroid*. 8th ed. Philadelphia, PA: Lippincott Williams & Wilkins, 2000, 755–761.
- [19]. Román GC. Nutritional disorders of the nervous system. In: Shils ME, Shike M, Ross AC, Caballero B, Cousins RJ, editors. *Modern nutrition in health and disease*. 10th edition (50th Anniversary Edition). Philadelphia: Lippincott Williams & Wilkins, 2005, p.1362–80.
- [20]. Gaitan E. *Environmental goitrogenesis*. Boca Raton, Florida: CRC Press, 1989.