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Review Article

Herbal Remedies in Traditional Medicine for Thyroid Disorders

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ABSTRACT

Herbal medicines have been widely acknowledged for their therapeutic value in treating numerous diseases. Metabolic disorders, which develop gradually but disrupt various bodily functions, pose a significant health challenge. Herbal remedies act synergistically on multiple biochemical pathways, providing a holistic and natural approach to managing such disorders. Among these, thyroid dysfunction is one of the most common endocrine disorders worldwide and remains a major public health concern. Although herbal treatments have been used for centuries in traditional healing practices, their acceptance in modern clinical settings is still limited due to insufficient scientific validation and standardized evidence of effectiveness. However, growing concerns about the adverse effects and high costs of synthetic drugs have renewed global interest in exploring herbal alternatives. This review aims to highlight the potential of herbal medicines in the treatment of thyroid and related metabolic disorders. It focuses on five specific herbs known for their ability to regulate thyroid hormone levels and enhance glandular function through antioxidant activity, modulation of hormone synthesis, and improvement of metabolic balance. Integrating traditional herbal wisdom with scientific research can pave the way for safer, more effective, and affordable therapies for thyroid-related diseases.

INTRODUCTION

In the current era, considerable emphasis is being placed on expanding the frontiers of medicine through the study of phytoconstituents and secondary metabolites. In the recent past, particularly about a decade ago, the application of herbal drugs and phytomedicines was largely

disregarded, as allopathic medicine-maintained dominance within the global healthcare system. During that time, Western medical practice relied extensively on synthetic pharmaceuticals, often underestimating the therapeutic significance and potential of naturally derived plant compounds.¹ Over the past few years, herbal medicines have regained prominence in the treatment of several metabolic disorders, including diabetes and

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hormonal imbalances. The objective of the present review is to elucidate the therapeutic relevance of herbal drugs in the management of the gradually progressing endocrine disorder, thyroid dysfunction. In India, diabetes mellitus and thyroid disorders represent two of the most prevalent endemic metabolic diseases, with a remarkable rise in their incidence over the past few decades. Both conditions are closely associated with metabolic dysregulation primarily resulting from improper lifestyle habits and altered physiological homeostasis.^{2,3} The endocrine system constitutes an intricate network of glands that regulate a wide spectrum of vital physiological activities in the human body, ranging from cardiovascular rhythm to reproductive function. It encompasses ten principal glands, including the thyroid, adrenal, pituitary, and parathyroid glands, along with the hypothalamus, pancreatic islet cells, thymus, pineal gland, ovaries, and testes. Even minor alterations within this system can disturb its finely tuned hormonal equilibrium, giving rise to diverse endocrine pathologies. These disorders are typically classified according to several criteria: (i) abnormalities in hormone secretion, whether hypersecretion or hyposecretion; (ii) the formation of lesions or neoplasms within endocrine tissues that may or may not alter hormonal output; (iii) infectious processes impairing glandular activity; and (iv) the inability of one endocrine gland to adequately stimulate another. Under normal physiological circumstances, hormonal homeostasis is maintained through precise feedback control mechanisms; however, any disruption in these regulatory pathways can compromise endocrine balance, ultimately leading to disease manifestations contingent upon the specific gland involved. The thyroid gland is an essential component of the endocrine system, critically involved in the regulation of multiple physiological processes, including oxygen consumption, growth, development, and cellular

metabolism. Anatomically positioned in the anterior region of the neck, the gland synthesizes and secretes the hormones thyroxine (T4) and triiodothyronine (T3), which are transported via the bloodstream to modulate basal metabolic rate, somatic growth, and overall physiological development. Thyroid disorders present with a wide spectrum of clinical manifestations, such as fatigue, depression, constipation, abnormal body weight changes, cold intolerance, bradycardia or tachycardia, tremors, diarrhoea, irritability, anxiety, and sleep disturbances. Thyroid dysfunction constitutes one of the most common endocrine disorders worldwide, with an estimated 42 million cases reported in India alone, underscoring its significant public health impact.⁴ The therapeutic management of thyroid disorders generally encompasses hormone replacement therapy, iodine supplementation, surgical procedures, and/or administration of antithyroid agents, tailored according to the specific disorder type and its clinical severity. Nevertheless, these conventional treatment strategies are frequently accompanied by adverse effects, such as myopathy, anorexia, alopecia, and additional systemic complications.⁵ Certain drugs can alter thyroid function or worsen hypo- and hyperthyroid symptoms, emphasizing the need for a structured patient management approach. Recently, alternative medicinal strategies, particularly herbal therapies, have gained attention for their efficacy and minimal side effects. This chapter reviews thyroid dysfunctions and explores the role and mechanisms of herbal medicines in managing these disorders effectively.

Thyroid Disorders

Hypothyroidism: Hypothyroidism, commonly referred to as underactive thyroid disease, is defined by inadequate secretion of thyroid hormones, triiodothyronine (T3) and thyroxine



(T4), from the thyroid gland. These hormones are critical regulators of basal metabolism, modulating cardiovascular function and thermoregulation. Deficiency of T3 and T4 results in a generalized metabolic slowdown and can further impair thyroid hormone synthesis. Clinically, hypothyroidism presents with a spectrum of symptoms, including fatigue, depression, anxiety, dry skin, brittle hair, facial edema, periorbital puffiness, and heightened sensitivity to cold temperatures. The conventional management involves the daily administration of levothyroxine to normalize circulating thyroid hormone levels. Nonetheless, prolonged therapy may lead to alterations in lipid metabolism, including decreased cholesterol levels, as well as unintended weight reduction.

Hyperthyroidism: Hyperthyroidism, also referred to as overactive thyroid disease, is often used interchangeably with thyrotoxicosis, a condition resulting from excessive thyroid hormone levels. This disorder is less prevalent than hypothyroidism and frequently arises secondary to conditions such as Graves' disease, toxic multinodular goiter, or toxic adenomas. Clinically, hyperthyroidism is characterized by a constellation of symptoms, including exophthalmia, irritability, fatigue, elevated basal metabolic rate (BMR), hyperactivity, dysphoria, tachycardia, unintentional weight loss, increased appetite, diarrhea, polyuria, and tremors.⁶ The management of hyperthyroidism is primarily symptomatic and involves antithyroid agents (such as methimazole and propylthiouracil), beta-adrenergic blockers (including propranolol, atenolol, and metoprolol) for rapid relief of symptoms, radioactive iodine therapy, and surgical intervention. Antithyroid medications inhibit the biosynthesis of thyroid hormones but may be associated with adverse effects, including agranulocytosis, fever, pharyngitis, and increased

susceptibility to infections. Long-term administration of these drugs can achieve disease remission, although surgical intervention may subsequently be required. Beta-adrenergic blockers ameliorate hyperthyroid manifestations by counteracting the metabolic effects of excess thyroid hormones; however, they do not decrease circulating hormone concentrations and therefore do not address the underlying pathophysiology of hyperthyroidism, which can vary depending on the etiology.

Goiter: Goiter is defined as an abnormal, usually painless enlargement of the thyroid gland, which may result in respiratory and swallowing difficulties. This condition frequently arises due to dietary iodine deficiency; however, not all cases exhibit clinical manifestations such as throat tightness, anterior neck swelling, cough, hoarseness, or dysphagia. Goiter can be transient and resolve spontaneously without intervention, or it may signify an underlying chronic thyroid disorder necessitating medical evaluation. Thyroid enlargement is often associated with various thyroid pathologies, where increased activation of thyroid-stimulating hormone (TSH) receptors enhances thyroid hormone synthesis, leading to increased vascularization and hypertrophy of the gland.⁷ Goiter is not a distinct medical condition but often serves as an indicator of underlying disorders. It may result from a variety of causes, including autoimmune diseases, hypothyroidism, hyperthyroidism, Hashimoto's thyroiditis, cyanide exposure, Graves' disease, ingestion of goitrogenic substances, thyroid hormone resistance, adverse drug reactions, thyroid neoplasms, acromegaly, and thyroiditis, among others.

Thyroid nodules (benign) and cancer (malignant): Thyroid nodules, either benign or malignant, include colloid nodules, cysts, and

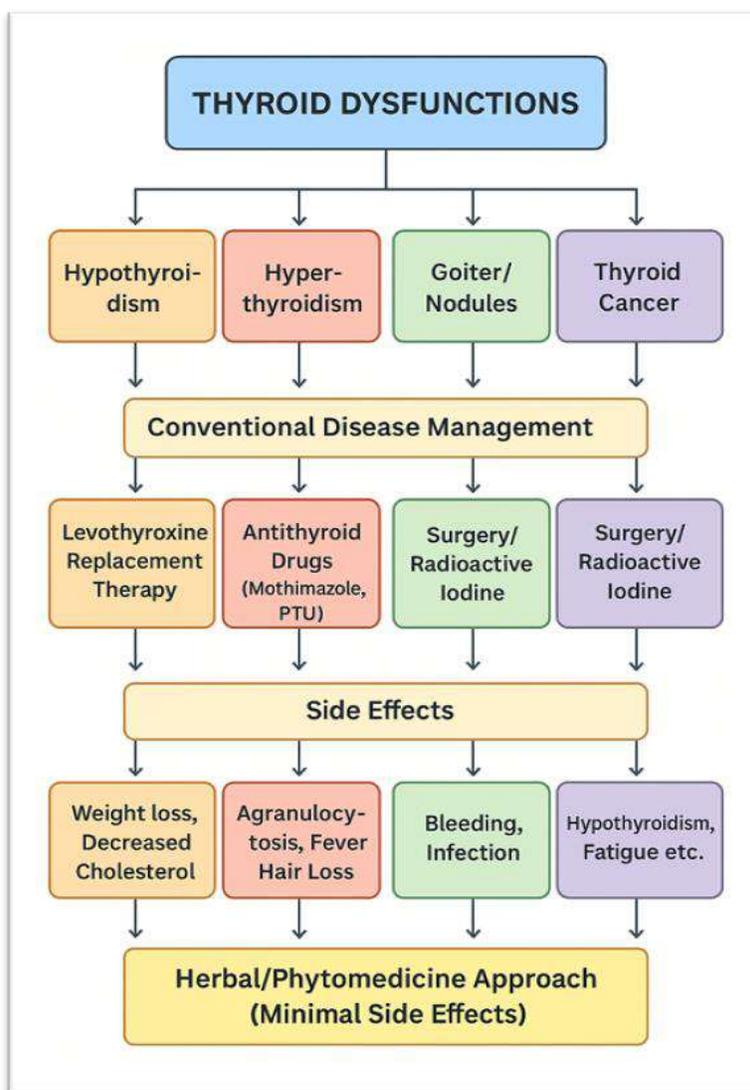


nodular thyroiditis, affecting approximately 5% of the population. Most nodules are asymptomatic, with only ~1% being cancerous, though some may cause palpable neck masses, dyspnea, or dysphagia. Benign nodules are typically monitored through thyroid function tests, ultrasonography, and physical examination. While many remain stable and require no treatment, enlarging nodules may necessitate surgical removal, radioactive therapy, or thyroid hormone administration. The National Cancer Institute (USA) reports that approximately 56,000 new cases of thyroid cancer are diagnosed annually, with females demonstrating a threefold higher incidence than males. Thyroid malignancies are generally more aggressive in older populations, with a lifetime prevalence of approximately 1.2%. The disease is often asymptomatic but may occasionally present as a palpable cervical mass or, less frequently, with voice changes such as hoarseness. Although thyroid nodules are detected in roughly 75% of the population, the majority are benign. The risk of malignant transformation is comparatively higher in children and adolescents than in adults. By the age of 80, nearly 90% of individuals are estimated to develop at least one thyroid nodule.^{8,9} Thyroid cancer is divided into four main types: papillary or mixed papillary/follicular (~85%), follicular or Hürthle cell (~10%), medullary (~3%), and anaplastic (~1%). High-resolution ultrasonography is used to assess the nature of thyroid nodules, guiding partial or total thyroidectomy. Medullary cases require regional lymph node removal, while anaplastic cases may necessitate tracheostomy. Post-surgery, patients are managed with individualized radioactive iodine therapy and lifelong levothyroxine supplementation.¹⁰

Hashimoto's thyroiditis: Hashimoto's thyroiditis, or chronic lymphocytic autoimmune thyroiditis, is the leading cause of hypothyroidism in the United States. It is an autoimmune disorder in which anti-thyroid antibodies target and damage thyroid tissue, resulting in inflammation and progressive hypothyroidism. Clinical manifestations include fatigue, weight gain, joint stiffness, constipation, cold intolerance, facial and periorbital edema, hair thinning, menstrual irregularities, bradycardia, and cognitive impairment. The disease predominantly affects females aged 30–50 and is more common in individuals with other autoimmune conditions such as type 1 diabetes, rheumatoid arthritis, lupus, Addison's disease, vitamin B12 deficiency, or gluten sensitivity. While not all hypothyroidism cases are caused by Hashimoto's thyroiditis, levothyroxine therapy effectively restores normal thyroid function in affected patients.¹¹ In summary, thyroid dysfunctions are prevalent conditions that significantly impact human health, and current therapeutic options are often limited by various adverse effects and constraints. These challenges underscore the need for alternative treatment strategies. Herbal medicines, or phytomedicines, offer promising therapeutic potential due to their efficacy and minimal side effects. Consequently, greater emphasis should be placed on the translational research and clinical application of herbal formulations, bridging bench-side findings to bedside therapies for the management of thyroid disorders.

Fig.1. A representative diagram depicting various thyroid disorders, standard treatment methods with their associated side effects, and a comparison with herbal medicine-based approaches.





Role of Herbs in Thyroid

Medicinal plants have been employed since ancient times for their pharmacological properties. Bioactive phytochemicals present in these plants exert physiological effects on the human body, and herbal formulations are typically associated with a lower incidence of adverse effects. Additionally, numerous culinary herbs and spices serve as sources of bioactive compounds with therapeutic potential.¹² In recent years, there has been significant interest in medicinal plants, particularly those utilized in traditional systems such as Ayurveda, Siddha, Unani, Modern Arñichi, Homeopathy, and Naturopathy.

Phytopharmaceuticals derived from plants are considered relatively safe and demonstrate notable efficacy in managing various diseases. Moreover, traditional folk medicine continues to play a significant role in human health and in shaping interactions with the environment.

Mechanism of Action

The standard treatment for hypothyroidism predominantly involves levothyroxine replacement therapy. Nonetheless, long-term administration of this therapy has been linked to neurocognitive deficits, diminished quality of life, and suboptimal patient adherence.

Phytotherapeutic interventions and their bioactive compounds have emerged as viable alternatives for hypothyroidism management. In this regard, *Costus pictus* (family Costaceae), commonly referred to as the insulin plant due to its antidiabetic activity, has shown potential efficacy in hypothyroidism. Extracts of this plant have been reported to normalize thyroid hormone levels and enhance overall thyroid function.¹³ For example, seaweeds are frequently utilized in the management of thyroid disorders owing to their high iodine content. *Fucus vesiculosus* (bladderwrack, a brown seaweed) has demonstrated thyroid-stimulating activity; however, there is a lack of established evidence regarding its safety, therapeutic efficacy, and clinical dosing parameters.¹⁴ *Fucus vesiculosus* and sea kelp (*Ascophyllum nodosum*) are recognized as rich natural sources of iodine; however, excessive consumption may lead to hyperthyroidism.

The administration of *withania* (1.4 g/kg body weight) in combination with *Bauhinia purpurea* (2.5 mg/kg body weight) markedly improved thyroid function and alleviated diabetes-induced hypothyroidism.¹⁵ *Triphladya Guggulu* exerts direct effects on the thyroid gland independent of the pituitary–TSH axis. *Commiphora mukul* (Guggul) exhibits thyroid-stimulating activity and aids in reducing LDL levels in hypothyroid conditions. Administration of Guggulu (200 mg/kg/day) for 30 days enhanced thyroid function and demonstrated antioxidant and antiperoxidative effects by upregulating the activity of superoxide dismutase (SOD) and catalase (CAT), thereby contributing to the amelioration of hypothyroidism.¹⁶

Medicinal Herbs with Therapeutic Potential for Thyroid Disorders

- 1. Aegle marmelos L. Correa:** Local Name: Bael; Family: Rutaceae; Plant Part Used: Leaves; Distribution: Southeast Asia, widely cultivated throughout India. Bael (*Aegle marmelos*) is a nutraceutical and medicinally important fruit-bearing plant, well-suited for cultivation in water-deficient regions. The fruit is rich in riboflavin, vitamin A, carbohydrates, and other nutrients. Phytochemical investigations have revealed the presence of bioactive constituents such as alkaloids, coumarins, and steroids in various plant parts. Bael is traditionally regarded as a panacea for gastrointestinal disorders, with marmelosin (0.03–0.37%) being the principal therapeutically active compound, the concentration of which varies with cultivar and geographic location.¹⁷



Fig.2. *Aegle marmelos* L. Correa

It has been used since ancient times in the preparation of various Ayurvedic medicines.¹⁸

- 2. Aloe barbadensis:** Local Name: Aloe vera, Family: Liliaceae, Part Used: Leaves, Geographical Source: Commonly cultivated in Rajasthan, Andhra Pradesh, Tamil Nadu, Maharashtra, and Gujarat. Therapeutic Uses: The drug is employed for its anti-obesity, hypocholesterolemic, and antidiabetic properties.¹⁹



Fig. 3. Aloe barbadensis

It is well recognized for its diverse therapeutic properties such as protection against UV and gamma radiation-induced skin damage, anti-inflammatory activity, immune-modulatory effects, as well as moisturizing and anti-aging benefits.²⁰

3. Avena sativa L.: Local Name: Jai / Javi, Family: Poaceae, Part Used: Young seeds, Distribution: Northern and Southeastern regions of Asia, Avena sativa L. (Oats) is a nutritive cereal plant belonging to the family *Poaceae*. The grains are a rich source of proteins, fibers, calcium, and essential vitamins such as B, C, E, and K, along with amino acids and natural antioxidants including β -carotene, polyphenols, chlorophyll, and flavonoids. The presence of β -glucan and avenanthramides contributes to its pharmacological significance by enhancing immune functions, aiding in the detoxification process, and reducing serum cholesterol levels. Moreover, these bioactive constituents promote lipid metabolism, assist in weight management, and regulate insulin secretion, thereby exhibiting antidiabetic potential and maintaining an improved lipid profile.²¹



Fig.4. Avena sativa L.

4. Bacopa monnieri L. Pennell.: Local Name: Brahmi, Family: Scrophulariaceae, Part Used: Leaves, Distribution: Southern and Eastern regions of India, Australia, and Europe, *Bacopa monnieri* (Brahmi) is an important medicinal herb belonging to the family *Scrophulariaceae*. The leaves contain a wide range of bioactive secondary metabolites, notably bacosides, which are responsible for its therapeutic potential. Pharmacologically, Brahmi acts as a potent neurotonic, enhancing cognitive functions, alleviating depression, and supporting overall mental health. Additionally, it exhibits antioxidant, anti-inflammatory, and anti-hepatotoxic activities, contributing to its role in the prevention and management of various neurological and hepatic disorders.²²



Fig.5. Bacopa monnieri L. Pennell

5. Fucus vesiculosus: Local Name: Bladderwrack, Family: Fucaceae, Part Used: Whole plant,

Distribution: Coastal regions of the Atlantic and Pacific Oceans, *Fucus vesiculosus* (Bladderwrack) is a marine brown alga belonging to the family *Fucaceae*. The entire thallus is utilized for its therapeutic and nutritional properties. Pharmacognostically, it serves as a rich source of essential nutrients such as carbohydrates, proteins, minerals, and polyunsaturated fatty acids, along with several bioactive constituents that exhibit significant pharmacological potential. These compounds contribute to various health-promoting activities, offering beneficial effects against a wide range of physiological disorders and metabolic diseases.²³



Fig.6. *Fucus vesiculosus*

Such as exhibiting anti-inflammatory properties, supporting thyroid function, promoting skin health, and aiding in the regulation of menstrual cycle patterns.²⁴

6. *Commiphora wightii*: Local Name: Guggul / Guggal, Family: Burseraceae, Part Used: Resinexudate from branches, Distribution: India, Bangladesh, and Pakistan, *Commiphora mukul* (Guggul) is a resinous medicinal plant of the family *Burseraceae*. The resin exuded from its branches contains the bioactive steroidal compound Guggulsterone, which pharmacologically enhances thyroid activity by stimulating the conversion of T4 to the more active T3 hormone, thereby supporting metabolic regulation and endocrine health.²⁵



Fig.7. *Commiphora wightii*

It has been traditionally employed in the management of various ailments including inflammation, gout, rheumatism, obesity, and lipid metabolism disorders. The resin comprises a complex mixture of phytoconstituents, including volatile oils with terpenoidal components such as monoterpenoids, sesquiterpenoids, diterpenoids, and triterpenoids; along with steroids, flavonoids, guggulsterols, lignans, sugars, and amino acids, all contributing to its diverse pharmacological activities.²⁶

7. *Linum usitatissimum* L.: Local Name: Alsi, Family: Linaceae, Part Used: Seeds, Distribution: Madhya Pradesh, Uttar Pradesh, West Bengal, Odisha, Assam, *Linum usitatissimum* (Flaxseed) is a medicinally and nutritionally important seed belonging to the family *Linaceae*. It is a rich source of omega-3 fatty acids (particularly alpha-linolenic acid), the lignan secoisolariciresinol diglucoside, and dietary fiber. These bioactive constituents contribute to its pharmacological significance by exhibiting anti-inflammatory, antioxidant, and lipid-regulating activities, thereby promoting overall health in both humans and animals.²⁷



Fig.8. *Linum usitatissimum* L.

Flaxseed is an abundant source of dietary fiber, constituting approximately 40% of its composition, with soluble fiber making up 25% and insoluble fiber 75%. The soluble fraction, which includes gums, pectin, and β -glucan, plays a significant role in lowering blood glucose levels and absorbing cholesterol and triglycerides, thereby contributing to the prevention of cardiovascular diseases and diabetes.²⁸

8. *Pistia stratiotes* L.: Local Name: Jalkumbh, Family: Araceae, Part Used: Leaves, Distribution: Asia, Africa, and America, *Colocasia esculenta* (Jalkumbh) is a medicinally significant herb of the family Araceae. The leaves possess antiseptic, antitubercular, and antidysenteric properties. Traditionally, leaf infusions have been employed in folk medicine for the management of edema (dropsy), urinary and bladder disorders, renal ailments, hematuria, dysentery, and anemia, reflecting its broad spectrum of therapeutic applications.²⁹



Fig.9. *Pistia stratiotes* L.

9. *Withania somnifera* L.: Local Name: Ashwagandha, Family: Solanaceae, Part Used: Roots, Distribution: Africa, Sri Lanka, and arid regions of India, *Withania somnifera* (Ashwagandha) is a medicinally important herb belonging to the family Solanaceae. The roots contain a diverse array of phytoconstituents including steroids, flavones, alkaloids, carbohydrates, glycosides, saponins, tannins, terpenoids, and coumarins. Additionally, the roots are reported to contain eight distinct polyphenols, comprising five phenolic acids—vanillic acid, benzoic acid, p-coumaric acid, gallic acid, and syringic acid—and three flavonoids—naringenin, catechin, and kaempferol, which contribute to its wide range of pharmacological activities.³⁰



Fig.10. *Withania somnifera* L.

The principal bioactive constituent of *Withania somnifera* is Withaferin, which pharmacologically enhances thyroid function, promotes

antiperoxidative activity, and stimulates the production of T4 hormone.³¹

10. Zingiber officinale (Rpsc.): Local Name: Adrak, Family: Zingiberaceae, Part Used: Rhizome

Distribution: Karnataka, Odisha, Assam, Meghalaya, *Zingiber officinale* (Ginger) is a medicinal rhizome belonging to the family *Zingiberaceae*. Its phytochemical profile is dominated by sesquiterpenoids, with zingiberene as the principal component. Other sesquiterpenoids such as β -sesquiphellandrene, bisabolene, and farnesene, along with a minor fraction of monoterpenoids including β -phellandrene, cineol, and citral, have also been reported. Pharmacologically, ginger may act as an immunogenic agent, potentially triggering subacute thyroiditis via an autoimmune mechanism that alters the antigenic properties of thyroid follicular cells.³²



Fig. 11. *Zingiber officinale* (Rpsc.)

11. Bugleweed (*Lycopus virginicus*): *Lycopus virginicus* (Bugleweed) is a medicinal herb of the family Lamiaceae, widely recognized for its thyrosuppressive activity. The herb is considered one of the most effective natural agents for the management of thyroid disorders. Its phytochemical profile includes hydrocinnamic acid derivatives such as lithospermic acid, rosmarinic acid, chlorogenic acid, and caffeic acid.

Pharmacologically, Bugleweed and its extracts exert multiple beneficial effects: they inhibit the binding of thyroid-stimulating antibodies in Graves' disease, suppress the secretion of thyroid-stimulating hormone (TSH), reduce peripheral deiodination of T4, and interfere with iodine metabolism, collectively contributing to the regulation of thyroid function.³³



Fig.12. Bugleweed (*Lycopus virginicus*)

12. Lemon balm (*Melissa Officinalis*): *Melissa officinalis* (Lemon Balm) is a medicinal herb employed as a thyrosuppressive agent in the management of hyperthyroidism. It exerts its activity by blocking the binding of thyroid-stimulating hormone (TSH) to its receptor, acting on both the hormone and the receptor. Additionally, it inhibits TSH receptor-mediated cyclic AMP (cAMP) production, reducing thyroid stimulation. The herb is rich in rosmarinic acid, a polyphenolic compound that modulates IgG antibody activity. By influencing the immune response rather than directly stimulating thyroid receptors, rosmarinic acid reduces the action of IgG antibodies on the thyroid gland, thereby potentially inhibiting autoimmune activity. Traditionally, *Melissa officinalis* has also been used to alleviate symptoms associated with hyperthyroidism, including insomnia, tachycardia, and hyperactivity.³⁴



Fig.13. Lemon balm (*Melissa Officinalis*)

13. Motherwort (*Leonurus cardiaca*): *Leonurus cardiaca* (Motherwort) is a medicinal herb traditionally employed either alone or in combination with other herbs. It is primarily recognized for its anti-inflammatory activity, attributed to the presence of quercetin, a bioactive flavonoid. In the context of autoimmune disorders such as hyperthyroidism, reducing inflammation is crucial, making Motherwort a suitable therapeutic option. Pharmacologically, it also inhibits the enzyme 5'-deiodinase, contributing to decreased thyroid hormone activation alongside its anti-inflammatory effects. Traditionally, *Leonurus cardiaca* has been used to alleviate symptoms associated with hyperthyroidism, including anxiety, palpitations, and tachycardia.



Fig.14. Motherwort (*Leonurus cardiaca*)

14. Gromwell (*Lithospermum ruderale*): *Lithospermum officinale* (Gromwell) is a medicinal herb belonging to the family Boraginaceae and exhibits pharmacological activities similar to Bugleweed (*Lycopus virginicus*). The herb contains rosmarinic acid as a principal bioactive constituent. In the context of hyperthyroidism, Gromwell acts by blocking the binding of thyroid-stimulating hormone (TSH) to thyroid follicles, inhibiting iodine transport into the follicles, reducing peripheral deiodination of T₄, and decreasing overall secretion of thyroid hormones, thereby contributing to the regulation of thyroid function.³⁵



Fig. 15. Gromwell (*Lithospermum Ruderale*)

15. Rose marry (*Rosmarinus officinalis*): *Rosmarinus officinalis* (Rosemary) is a medicinal herb belonging to the family Lamiaceae. The plant is rich in rosmarinic acid, a bioactive compound employed in the management of hyperthyroidism. Pharmacologically, Rosemary exhibits mechanisms similar to *Melissa officinalis* (Lemon Balm); rosmarinic acid modulates the effect of TSH on its receptor, inhibits immunoglobulin-mediated stimulation of the TSH receptor, and reduces peripheral conversion of T₃. These actions suggest that Rosemary and its constituents may also be beneficial in the treatment of Graves' disease.³⁶



Fig.16. Rose Marry (*Rosmarinus officinalis*)

16. Sage (*Salvia officinalis*): *Salvia officinalis* (Sage) is a medicinal herb belonging to the family Lamiaceae and is rich in rosmarinic acid, similar to *Rosmarinus officinalis* (Rosemary). Pharmacologically, Sage exerts thyrosuppressive activity by modulating the effect of TSH on its receptor, inhibiting immunoglobulin-mediated stimulation of the TSH receptor, and reducing peripheral conversion of T3. In addition to its effects on thyroid function, Sage demonstrates antiviral, antioxidant, nervine, and spasmolytic activities, contributing to its broad therapeutic potential.³⁷



Fig.17. Sage (*Salvia officinalis*)

17. Gotu Kola (*Centella asiatica*) : *Centella asiatica* (Gotu Kola) is a medicinal herb commonly employed in the management of hypothyroidism. The leaves contain bioactive constituents such as asiatic acid, asiaticoside, brahmoside, and brahmic acid (madecassic acid). Pharmacologically, Gotu Kola has been

reported to stimulate the synthesis of T4, thereby supporting thyroid function. Additionally, it acts as a nervous system tonic, enhancing energy, vitality, and overall physiological activity, which may further contribute to increased T4 production. Traditionally, tinctures prepared from Gotu Kola leaves are most commonly used for the therapeutic management of hypothyroidism.



Fig.18. Gotu Kola (*Centella asiatica*)

18. Coleus or forskohlii (*Plectranthus barbatus*): *Coleus forskohlii* (Forskohlii) is a medicinal herb widely used in the management of hypothyroidism. The plant contains essential oils and terpenoids, which contribute to its pharmacological activity. *Coleus forskohlii* is reported to enhance the synthesis and production of thyroid hormones and stimulate cyclic AMP (cAMP) production, thereby supporting thyroid function. It is also employed in combination with conventional synthetic thyroid medications to improve thyroid hormone levels, particularly in patients who have not undergone long-term pharmacotherapy.³⁸



Fig. 19. Coleus or forskohlii (*Plectranthus barbatus*)

Dosage

The dosage of phytotherapeutic formulations can exhibit significant inter-individual variability, complicating the establishment of uniform dosing guidelines. Administration often relies on conventional volumetric measures such as tablespoons, teaspoons, hand palm, little finger, cups, or glasses. For decoctions and infusions, a standard glass cup is typically employed, and honey (approximately one tablespoon) may be incorporated as a palatability enhancer, whereas sucrose or other sugars should be excluded. Certain preparations are recommended to be formulated 1–2 hours prior to administration, while others may require preparation and storage for up to one week to achieve optimal efficacy. Clinically, a typical regimen involves 1–3 teaspoons per dose, administered 1–3 times daily, depending on the specific phytoconstituents, formulation type, and patient-specific pharmacodynamic responses.³⁹

CONCLUSION

Hypothyroidism is linked to multiple cardiovascular and metabolic comorbidities, including hypertension, dyslipidemia, and systemic dysfunction, reflecting the critical regulatory role of thyroid hormones in physiological and pathophysiological processes. Standard treatment predominantly involves

levothyroxine replacement therapy, which, while effective in restoring hormone levels, may contribute to neurocognitive deficits, diminished quality of life, and suboptimal long-term adherence. Phytotherapeutic interventions have demonstrated efficacy in modulating thyroid function. Selected medicinal herbs can stimulate thyroid hormone biosynthesis, decrease serum TSH concentrations, augment T4 production, and enhance peripheral T4-to-T3 conversion, thereby improving endocrine homeostasis. Additional pharmacological benefits include anti-inflammatory effects, glycemic regulation, modulation of lipid profiles, maintenance of dermal health, and normalization of menstrual cyclicity. Specific bioactive constituents, such as sesquiterpenoids in *Zingiber officinale* (ginger), act as antigens on thyroid follicular cells, while withaferin A in *Withania somnifera* (Ashwagandha) enhances thyroid activity, exhibits antiperoxidative properties, and stimulates T4 synthesis. Dosage regimens of herbal preparations are individualized according to disease severity, patient-specific parameters, and clinical context. Administration frequently relies on standardized volumetric measures, including tablespoons, teaspoons, hand palm, little finger, cups, or glasses, as guided by qualified professionals. *Commiphora mukul* (Guggul) demonstrates thyroid-stimulating activity and contributes to the reduction of LDL cholesterol in hypothyroid subjects.

Several marketed herbal formulations combine multiple phytoconstituents to enhance therapeutic efficacy:

- Nutrisage Thyroid Health – comprising *Ashwagandha*, *Aegle marmelos* (Bael), and *Bacopa monnieri*.

- Bio Thyrobalance – a polyherbal formulation containing *Bhrami*, *Ashwagandha*, *Mulethi*, *Tulsi*, *Amla*, *Guggul*, and *Giloy*.
- Thyro Balance Juice – a natural preparation designed to support thyroid function.

In summary, medicinal herbs offer a natural, efficacious, and adjunctive approach to thyroid health management, either as monotherapy or in combination with conventional pharmacotherapy, underscoring the importance of evidence-based guidance, standardized dosing, and professional supervision.

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