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THYROID DISORDERS: EXPLORING HERBAL REMEDIES FOR ENDOCRINE HEALTH

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ABSTRACT

One of the most prevalent endocrine disorders worldwide is hypothyroidism, which is characterized by an increased thyroid-stimulating hormone (TSH) in the context of healthy free thyroid. hormone levels, including triiodothyronine and thyroxine. With advances in diagnostic testing, the identification of hypothyroidism has grown in recent years, and it reveals that SCH is more common. more than that of type 2 diabetes mellitus. However, since thyroid hormone action is well known to have an effect on lipid metabolism and the heart, any thyroid gland dysfunction should be taken seriously. altered serum lipid levels linked to cardiovascular disease risk factors may result from the surgery. The use of medicinal plants has shown to be an effective treatment method with fewer side effects. It lowers serum TSH levels and enhances cholesterol profile while simultaneously enhancing hypothyroidism condition. The possible functions of medicinal plants in treating hypothyroidism and enhancing thyroid function will be covered in this review. Terms
triiodothyronine, thyroxine, thyroid-stimulating hormone (TSH), therapeutic plants, hypothyroidism**.**

INTRODUCTION

Hypothyroidism is a common ailment in which the thyroid gland functions as an underactive gland, failing to manufacture sufficient
amounts of essential hormones. affecting mainly the elderly, women, and certain ethnic
groups. Hypothyroidism, though, may be in its primary or secondary stage, and it may also be either. overt, characterized by elevated TSH and low FT4 (free thyroxine) levels, or subclinical, defined by normal FT4 levels but high serum TSH.(1) Hypothyroidism is subclinical (SCH). is a kind of hypothyroidism characterized by high serum thyrotropin (TSH) or thyrotropin levels in conjunction with normal levels of thyroxine (T4) and triiodothyronine

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(T3). hormone. When TSH is over 4.5 mcU/mL and FT4 is normal, it is far more prevalent. TSH values between 4.5 and 10 mcU/mL are used to (Barbesino, 2019) diagnose it. But other things can also lead to SCH, even though it is typically thyroiditis with autoimmune consequences (Sue & Leung, 2020a). Despite the fact that this problem is not unique to the elderly, studies show that TSH levels increase with age. When there is high serum TSH and low Overt hypothyroidism, which affects 0.2 to 2% of non-pregnant adults, is diagnosed by circulating THs. A reduction in heart rate, cardiac output, and an Overt hypothyroidism is characterized by diastolic dysfunction and increased peripheral vascular resistance. Furthermore, there are significant alterations in modifiable atherosclerotic risk factors associated with overt hypothyroidism. Diastolic hypertension, hypercholesterolemia, increased carotid intimal-media thickness, and decreased endothelial nitric oxide are all contributing variables. Both the overt and SCH are linked to compromised high diastolic blood pressure, enhanced carotid intima hyperplasia, and vascular

Because thyroid hormone receptors are present in nearly every organ and tissue in our body, the clinical manifestations of this deficiency can vary. be rather diverse. The pulmonary, gastrointestinal, cardiovascular, musculoskeletal, and neurological systems, as well as the skin, kidneys, and connective tissues, can all be impacted. Furthermore, Depending on the severity of the illness, the symptoms of hypothyroidism can range from minor to severe (Aziz et al., 2017). Fatigue, weight gain, cold sensitivity, and Reduced quality of life, cognitive function, mood, and memory, as well as constipation, are all symptoms of SCH. However, people with SCH typically experience milder clinical symptoms. The signs are similar to those of overt hypothyroidism. People with SCH grade 1 may not exhibit these symptoms, but they could get worse. Additionally, it gets worse as TSH levels increase, albeit it varies depending on age, gender, race/ethnicity, and geography (Sue & Leung, 2020b). Additionally, the risk of cardiovascular illnesses, such as Low birth weight, miscarriages, subfertility, and neuropsychiatric symptoms are all consequences of SCH, along with liver disease, dyslipidemia, and coronary artery disease. Additionally, hypothyroidism is associated with an increased risk of recurrent miscarriage, infertility, menstrual irregularities, and ovulatory dysfunction. It's important to remember that TSH values were noticeably more prevalent in people who produced oocytes th at were not fertilized during a woman's plans for an in vitro fertilization cycle

CAUSES

One of the frequent causes of hypothyroidism worldwide is iodine deficiency. Another factor contributing to hypothyroidism in iodine-deficient areas is autoimmune thyroiditis. The general population also has a high proportion of thyroid peroxidase 13 antibodies. Due to reduced bioactivity, TSH levels are little higher. The majority of hypothyroidism cases are caused by pituitary adenomas. Head trauma, pituitary

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surgery, radiation therapy, heredity, and infiltrative disease can all cause pituitary or hypothalamic dysfunction, as well as central hypothyroidism, postsurgical or post-ablative hypothyroidism, and drug-induced hypothyroidism. some of the other contributing factors to hypothyroidism (Chaker et al., 2017).

SYMPTOMS

Since the symptoms of hypothyroidism affect whether the thyroid replacement treatment should be initiated, it is important to assess them. The most typical symptoms of hypothyroidism in adults are tiredness, inactivity, cold intolerance, weight gain, constipation, voice changes, and dry skin, although the clinical manifestation varies. may differ based on age, gender, and the interval between the start of symptoms and diagnosis. Hypothyroidism symptoms are often vague, particularly in older people, who exhibit fewer and less unique indicators than their younger counterparts. d ry skin, hair loss, loss of eyebrows, puffy face, cholelithiasis, diastolic hypertension, bradycardia, shortened attention span, muscle weakness, stiffness, irregular periods, and other symptoms Some of the other signs include this. Hypothyroidism treated with herbal remedies Medicinal Plants for Treating Hypothyroidism

Herbal remedies for thyroid illnesses have become more popular due to their effectiveness and safety, and they have less side effects. unfavorable outcome. To aid in hormone balancing, promote thyroid function as an iodine source, or lower thyroid activity, a variety of plant species are consumed worldwide. (3) The use of several medicinal herbs with the ability to treat thyroid problems has also been documented in comparison to medical treatment. to be efficient. According to an ethnopharmacological study conducted by Taïbi et al., 2021, medicinal plants are utilized to treat hypothyroidism. Among them, the majority of The families represented included Lamiaceae, Apiaceae, Fabaceae, Amaranthaceae, and Asteraceae. The following is a detailed description of the medicinal plants that were discovered to be useful for the treatment of hypothyroidism:



Fig (1)



Fig (2)

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Fig (3)



Fig (4)

HERBAL TREATMENT OF HYPOTHYRODISIM

Medicinal Plants in the Treatment of Hypothyroidism Herbal medicines for thyroid diseases have grown in popularity because of its effectiveness and safety, and have fewer adverse result. Several plant species are ingested around the world to help balancing thyroid hormones, supporting thyroid function as an iodine source, or decrease thyroid function (3). When compared to medication therapy the usage of a variety of medicinal herbs with potential for the treating thyroid issues has also been reported to be effective. In an Ethnopharmacological study by Taïbi et al., 2021 revealed the use of medicinal plants for hypothyroidism treatment. Among them the mostly represented families were Lamiaceae, Apiaceae, Fabaceae Amaranthaceae and Asteraceae. The medicinal plants which were found to be effective for the treatment of hypothyroidism with their detail description is given below:

Family Name	Species Name	Common Name	Availability (Country)	Active Constituents	Uses
Apiaceae	Centella asiatica	Gotu kola	Southeast Asian countries	Madecassic acid	Enhances synthesis of T4
Solanaceae	Withania somnifera	Ashwagandha	South Asia, Central Asia, Africa	Withaferin	Improves thyroid activity, boosts T4 production via T4→T3 conversion

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Ranunculaceae	Nigella sativa L.	Black cumin	SW Asia, Mediterranean, African regions	Thymoquinone	Raises T3, reduces anti-TPO synthesis, lowers VEGF levels
Asteraceae	Saussurea costus	Costus root	Western Himalayas (Pakistan, India)	Sesquiterpene terpenes (ST)	Alleviates hypothyroidism-induced hepatic enzyme derangement
Burseraceae	Commiphora mukul	Guggul	India, Bangladesh, Pakistan	Guggulsterone	Boosts T3 via T4→T3 conversion, enhances hepatic lipid peroxidation
Lamiaceae	Plectranthus barbatus	Coleus or forskohlii	Brazil, tropical Africa, China	Forskolin	Stimulates thyroid hormone production and synthesis

Centella asiatica

Due to its many health benefits, centella asiatica (C. asiatica) is widely used in traditional medicine. Improved memory, intellect, and neuronal protection are some of its claimed benefits. Perinatal hypothyroidism causes cognitive impairment, which is the hub of memory processing. Despite the fact that a number of experiments have demonstrated that C. asiatica extract can boost memory function, its efficacy as a memory enhancer for people with perinatal hypothyroid is still unclear. As a result, the goal of this study was to assess the impact of ethanol extract of C. asiatica (EEC) leaf as a memory enhancer in a perina-tal hypothyroid mouse model. Using the decoction process, the leaves of C. asiatica were extracted, and the ethanol extract was given to mice (5). Pregnant mice were given antithyroid drugs from gestational day 18 to postnatal day 21 to induce the hypothyroid mouse model. The hypothyroid From PND 21 to PND 35 (14 days), the treatment group (EEC 2 mg/kg BW/mL) or the positive control (donepezil 5 mg/kg BW/mL) were given to mice. In summary, the results of this study demonstrate the efficacy of C. asiatica in lowering anxiety

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and enhancing cognitive performance in a hypothyroid mouse model.



Fig (5)

Withania somnifera

Traditional Ayurvedic therapy frequently recommends ashwagandha (Withania somnifera L.) (Fig6) Dunal] for thyroid problems. The goal of this pilot trial was to determine whether it works. and the safety of ashwagandha root extract in people with subclinical hypothyroidism.
Ashwagandha root extract (600 mg daily) or starch as placebo. Serum TSH and serum triiodothyronine are the effectiveness variables. thyroxine (T4) levels, and (T3). Before the second session, a total of four participants—two from each group—withdrew their consent. Ashwagandh



Fig (6)

Nigella sativa L.

Treatment with *Nigella sativa* (Fig7) significantly reduced body weight and body mass index (BMI). Serum concentrations of thyroid stimulating hormone (TSH) and anti-thyroid peroxidase (anti-TPO) antibodies decreased while serum T3 concentrations increased in *Nigella sativa*-treated group after 8 weeks. There was a significant reduction in serum VEGF concentrations in intervention group[9]. None of these changes had been observed in placebo treated group. In stepwise multiple regression model, changes in waist to hip ratio (WHR) and thyroid hormones were significant predictors of changes in serum VEGF and Nesgfatin-1 values in *Nigella sativa* treated group ($P < 0.05$).



Fig (7)

Saussurea costus

Saussurea costus (S. costus) (Fig8) belongs to family of Asteraceae and is one of the therapeutic plants extensively used as a traditional medicine in Saudi Arabia. Constituents of this plant have the potential to be developed as bioactive molecules. Among Arabs, the prevalence of thyroid disorders ranges from 6.18 % to 47.34% and hypothyroidism has been reported to be the most prevalent. Although there is no natural treatment that can directly replace thyroid hormones, their role as an alternate treatment

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or as an add-on to available thyroid treatment has been explored. Flavanoids and antioxidant properties of S. costus may be an important mechanism involved in supporting its medicinal use. Current data on the possible role of S. costus in thyroid disorders is lacking and the available evidence is inconclusive[10]. This review deal with the current understanding of use and myth regarding the use of this medicinal plant in thyroid disease.



Fig (8)

Commiphora mukul

This was a randomized single blind standard controlled clinical study.The duration of study was 60 days in both the testand control groups. Patients were randomized into test and control groups by lottery method of randomization. Patients who are any other drug (Allopathic, Ayurvedic, Unani etc.) for this disease were asked to stop 15 days before enrolling into the study and were not allowed to take any other drug for hypothyroidis during the study period.The test drug *Commiphora mukul* (*Muqil)* (Fig9) showed significant effect on TSH levels, primary hypothyroidism. Hence, it can be concluded that the test drug has significant effect on objective parameters of primary hypothyroidism without having any toxic effect on any of the safety parameters. Hence the drug is safe and economical in the management of hypothyroidism.



Fig (9)

Plectranthus barbatus

Plectranthus barbatus (Fig10) is a most important plant in the Lamiaceae family, with a wide range of traditional medicinal applications. Its traditional applications could be explained by forskolin, a significant component with an adenylyl cyclase activation that is unique and underpins a variety of medicinal properties. It is present in various patented medicinal preparations that are sold over the-counter to treat a variety of diseases for anti-inflammatory, antibacterial, oxidative, cytotoxic, hypotensive, spasmolytic, hepatoprotective, and antifeedant properties which have been described for organic extracts, according to studies on numerous extracts with varied polarity derived from different parts of P. barbatus (Alasbahi & Melzig, 2010). Because it contains essential oils and terpenes, Forskolin is commonly used to treat hypothyroidism. Thyroid hormone production and synthesis are typically boosted by this plant. It stimulates the cyclic

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AMP synthesis. Also, it used to boost thyroid gland output in patients who haven't been on medication for a long time (Gupta et al., 2016b)



Fig (10)

CONCLUSION

Treatment purpose, application of medicinal plants has proven to be effective with less adverse effect. It improves hypothyroid status and decrease serum TSH concentrations along with improvement of cholesterol profile. Moreover, there are other plants with medicinal properties which can also be used in case of hypothyroidism. However, treatment with thyroxin replacement therapy with levothyroxine is the first choice for treatment. But this is a lifelong process with limitations. So, application of medicinal plants can be in addition to disease-specific drugs, a useful herbal supplement. Therefore, for its popular usage, it's high time to step up scientific research into the mechanisms of action of these medicinal plants evidently

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