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Herbal approach to management of thyroid disease - a review

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ABSTRACT

Endocrine disorders are common in India of which the thyroid disorders represent a major subset. Thyroid dysfunction prevalence is rising at an alarming rate in Indian population. Hypothyroidism and hyperthyroidism constitute the maximum percentage of thyroid diseases in India. Hormone replacement therapy has been a standard approach to thyroid dysfunction. However, herbal approach to treatment of thyroid dysfunction is gaining popularity as it is said to be equally effective, safe and devoid of any side effects. Ayurvedic system of medicine has been very effective in maintenance and treatment of hypothyroidism and hyperthyroidism. This review aims at providing comprehensive information regarding various herbal drugs used in Ayurveda acting towards correction of thyroid dysfunction.

Keywords: Hypothyroidism, Hyperthyroidism, Medicinal plants, Ayurvedic.

INTRODUCTION

The thyroid is an important part of the human endocrine system, which are responsible for regulation of oxygen use, basal metabolic rate, cellular metabolism and growth and development.[1] The thyroid gland secretes thyroxine (T_4) and tri iodothyronine (T_3), which are needed for proper growth and development and which are primarily responsible for determining the basal metabolic rate. The thyroid hormones are transported through the blood and act at the cellular level. Through the activation of genes, thyroid hormones stimulate protein synthesis, promote maturation of nervous system, and increase the rate of cell respiration in tissues, thus elevating the BMR.[2] The variations in the levels of these hormones lead to disturbed BMR and presents with signs and symptoms which are systemic in nature.

Thyroid disease is one of the commonest endocrine disorders worldwide. According to a recent projection from various studies, it has been estimated that about 42 million people in India suffer from thyroid diseases. About 1 to 2% of the adult population is known to suffer from thyroid disorders.[3] The need to combat this dysfunction has risen in recent years due to its increasing prevalence. Hormone replacement has been the choice of therapy. However, alternative medicinal approaches are gaining popularity in view of their efficacy with minimal side effects. This review throws light on various drugs of plant origin which have proven action on thyroid and its functioning and also on the various factors associated with thyroid dysfunction.

Understanding Thyroid dysfunction

There is increasing evidence that environmental exposures, specifically to pesticides, should also be considered potential risk factors for thyroid disease. Certain insecticides, herbicides, and fungicides, should also be considered potential risk factors for thyroid disease, reported to be endocrine disruptors and more specifically, thyroid disruptors acting through diverse mechanisms such as inhibition of thyroidal iodine uptake, interference at the thyroid hormone receptor, binding to transport proteins, interference with iodothyronine deiodinases, increased clearance of thyroid hormones, interference with cellular uptake of thyroid hormones and interference with thyroid hormone gene expression.[4]

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The signs and symptoms of hypothyroidism and hyperthyroidism are often non specific and vague if present. Measurement of TSH, T_3 and T_4 in serum is important for diagnosis of overt and subclinical thyroid dysfunction.[5] The decreased levels of thyroid hormones lead to hypothyroidism. Hypothyroidism presents with symptoms such as dry skin, decreased sweating, myxedema, puffy face with edematous eyelids, non pitting pretibial edema, pallor, retarded nail growth, dry brittle hair, constipation, weight gain, decreased libido and menstrual disturbances menorrhagia in common, oligomenorrhoea or amenorrhoea in long standing cases.[6]

Hyperthyroidism is caused as a result of excessive thyroid function often hyperthyroidism is considered synonymous with thyrotoxicosis (a state of thyroid hormone excess). However, thyrotoxicosis is usually secondary to graves' disease, toxic multinodular goitre and toxic adenomas. Hyperthyroidism presents with exophthalmos, increased BMR, hyperactivity, dysphoria, irritability, muscular weakness, nervousness, palpitation, fatigue, weight loss with increased appetite, diarrhoea, polyuria, warm moist skin and Tremor.[7]

Ayurvedic perspective

The thyroid disorders are mostly co-related to the conditions galaganda, gandamala of Ayurveda. However, the two diseases majorly relate to nodular outgrowths of the thyroid gland which can be compared to goitre and its types. The thyroid dysfunction is not characterised by prominent growths in the thyroid gland but might become swollen and palpable. On comparison of the aetiology and symptomatology there seems to be a similarity between the thyroid dysfunction and the conditions of sthoulya and karshya as mentioned in the ashtou ninditiya adhyaya of charaka samhita.[8]

The similarities noted between sthoulya and hypothyroidism are given in table 1.

On the other hand, a similar comparison is possible between hyperthyroidism and the condition of karshya.[9] The similarities noted between the two are given in table 2.

Treatment of thyroid dysfunction

Hormone replacement therapy is the most important mode of treatment available for thyroid dysfunction. Thyroid hormone replacement has been used for more than 100 years in the treatment of hypothyroidism, and there is no doubt about its overall efficacy. However, desiccated thyroid contains both thyroxine (T_4) and triiodothyronine (T_3); serum T_3 frequently rises to supranormal values in the absorption phase associated with palpitations. Liothyronine (T_3) has the same drawback and requires twice daily administration in view of its short half life.[11]

Possible adverse effects of this therapy include cardiovascular changes shortening of systolic time intervals increased frequency of atrial premature beats, left ventricular hypertrophy and bone changes reduced bone density and bone mass. They are given for long periods of time and cause adverse effects in 3 to 5% of patients. In most cases, adverse effects are minor and transient e.g. skin rash, itching, mild leucopoenia. The most dangerous effect is agranulocytosis, which occurs in 0.1 to 0.5% of patients. Other major adverse effects aplastic anemia, thrombocytopenia, lupus erythematous like syndrome and vasculitis are exceedingly rare.[4] The side effects of hormone replacement therapy compels for the need of safer modalities of treatment which are equally effective.

Medicinal plants have been identified and used throughout human history. Chemical compounds in plants mediate their effect on the human body. Herbal medicines produces lesser side effects. The herbs and spices used by humans to season food also yield useful medicinal compounds.[12] In recent years there has been a tremendous range of interest in the medicinal plants especially those used in Ayurveda, Siddha, Unani, Modern Arnchi, Homeopathy, Naturopathy. Drugs obtained from plant are believed to be much safer and exhibit a remarkable efficacy in the treatment of various ailments. The folk medicinal traditions play a reflecting and prominent role in human and environment interaction.[13]

Some of the plant drugs which are used in treatment of thyroid dysfunction and which have a direct action on the thyroid gland in conditions of hypothyroidism are given in table 3 along with their probable mode of action. The drugs acting towards alleviation of hyperthyroid are given in Table 4.

Home remedies and other diet regimen

- Flaxseed is an important home remedy for normal functioning of the thyroid gland. Flaxseed is common in essential omega 3 fatty acids. People suffering from hypothyroidism should take flaxseed regularly to regulate the functioning of the thyroid gland.

Dose: Take one tea spoon of flaxseed powder with water regularly to balance the thyroid hormones.

- Ginger is an important home remedy for thyroid functioning. Ginger is rich in zinc, potassium and magnesium. Ginger is good herbal remedy as it has anti-inflammatory properties. Ginger may be used in various ways to treat thyroid disorders.

Dose: Drink ginger tea or consume it in the dried form to treat hypothyroidism.

- Coconut oil is a good remedy for the treatment of thyroid disorders. Coconut oil may be used as a cooking oil to maintain the normal functioning of the thyroid gland.

Dose: Take a glass of milk and add 2 teaspoon of coconut oil and drink it every day to regulate the thyroid gland functioning of the thyroid gland.

- Exposure to sun is also a good remedy for regulating the functioning of the thyroid gland. Exposure your body to sun for 10-15 minutes every day to maintain healthy immune system.

- Good exercise and yoga asana may also help in regulating the functions of the thyroid gland.

- Iodine rich food also helps in regulating and normalizing the functioning of the thyroid gland.

- A fine paste made of the vegetable jalakumbhi (*pistia straticies*) applied over the affected parts help in reducing the swelling. The juice obtained from the jalakumbhi should be given in doses of 11 to 22 grams a day. It increases the amount of iodine the lack which according to allopathy is one of the factors responsible for the disease[31].

Table 1: Showing comparison between Sthoulya and Hypothyroidism

	Sthoulya [9]	Hypothyroidism [6]
Aetiology	Guru madhura sheeta Snigdha upayoga	
	Avyayama	Sedentary lifestyle
	Avyavaya	
	Divasvapna	Irregular sleeping habits
	Harsha nitya	
	Achinta	
	Beejasvabhava	Hereditary
Symptomatology	Sthoulya	Weight gain
	Ayusho hrasa	Mortality due to complications such as Cardiovascular diseases
	Javoparodha	Lethargy
	Krucchravyavaya	Decreased libido
	Dourbalya	Fatigue, weakness
	Dourgandhya	
	Svedabadha	Dry skin
	Atikshut	Increased appetite
	Atipipasa	Increases thirst

Table 2: Showing comparison between Karshya and Hyperthyroidism

	Karshya [10]	Hyperthyroidism [7]
Aetiology	Ruksha annapana	
	Langhana	
	Kriya atiyoga	
	Nidra vega dharana	Stress and other psychological causes
	Shoka	
	Krodha	
Symptomatology	Na sahati Vyayama, Kshut, Pipasa, Ati sheeta, Ati ushna	Fatigue and inability to conduct day to day activities
	Kasa	
	Kshaya	Weight loss
	Shvasa	Palpitation
	Grahani	Diarrhoea
	Shushka sphik udara greeva	Muscular wasting
	Dhamani jaala santata	Predominant venation
	Sthula parva	Prominently visible joints due to muscle wasting

Table 3: Showing plants that act on Hypothyroidism

Plant	Anti thyroid activity
Fucus vesiculosus var. *divaricatus* Family: Fucaceae [14]	Treatment of thyroid disorders, marine alga rich in iodine, which is being used in alternative medicine as a laxative, diuretic, as a complement for weight loss and as source of iodine, particularly hypothyroidism.
Bacopa monnieri (L.) Wettst. Family: Scrophulariaceae [15]	Stimulates thyroid activity by increasing the amount of T_4 useful in treatment hypothyroidism
Withania somnifera (L.) Dunal	Previous studies indicate Ashwagandha is a useful treating agent for hypothyroidism. Significant

Family: Solanaecae [16-17]	increase in serum T_4 levels indicates the stimulating effect at the glandular level via its effect on cellular antioxidant systems. *Withania* may also stimulate thyroid activity indirectly, via its effect on cellular antioxidant systems
Coleus forskohlii (Willd.)	*Coleus forskohlii*, a traditional Ayurvedic thyroid herb, contains essential oils and diterpenes. Thyroid
Family: Lamiaceae [18]	hormone production and secretion are increased by coleus. *Coleus* can help normalize hormone levels.
Commiphora mukul Hook.	Modern studies have indicated that certain components of guggulu resin the guggulsterones have
Family : Burseraceae [19]	anti-inflammatory actions, reduce cholesterol and other blood lipids, and support thyroid function in a number of ways.
Fucus and Laminaria species	Seaweeds contain iodine and polysaccharides that affect thyroid hormone production and conversion
Family: Laminariaceae [18]	of seaweeds on the thyroid, these plants have traditionally been used to treat thyroid issues.
Bauhinia purpurea L.	It is known to possess antibacterial, antidiabetic, analgesic, anti-inflammatory, anti diarrheal,
Family: Caesalpiniaceae [20]	anticancerous, nephroprotective and thyroid hormone regulating act.
Ficus carica L.	Only one thyroid hormone- either T_3or T_4 was altered by the plant extract.
Family: Moraceae [21]	
Mangifera indica L.	Showed thyroid stimulatory and anti-peroxidase roles.
Family: Anacardiaceae [22]	
Lithospermum officinale	Club moss influences the hypothalamic pituitary thyroid axis. It can inhibit peripheral T_4 deiodination,
Family: Boraginaceae [23]	thus activating T_3. The older studies that examined herbs in combination show that club moss may act as a block of TSH receptors

Table 4: Showing plants that act on Hyperthyroidism

Plant	Anti thyroid activity
Melissa officinalis L.	As noted in the older studies, lemon balm is effective in blocking the binding of TSH to the receptor by
Family: Lamiaceae [23]	acting on the hormone and the receptor itself. It also inhibits cyclic AMP production stimulated by TSH receptor antibodies. Traditionally, lemon balm has been used to treat symptoms associated with hyperthyroidism, like tachycardia, insomnia, and hyperactivity.
Convolvulus pluricaulis Choisy.	*Convolvulus pluricaulis* acts strongly on some of the liver enzymes and helps in improving symptoms of
Family: Convolvulaceae [24]	hyperthyroidism. It has antiulcer properties and is helpfulness in alleviating the symptoms of hyperthyroidism. The studies on *C. pluricaulis* have also put forward that it is beneficial in remedying hypothyroidism.
Leonurus cardiaca L.	In autoimmune diseases, it is important to reduce inflammation, making motherwort a good choice in
Family: Lamiaceae [23]	treating hyperthyroidism. In addition to reducing inflammation, the enzyme 5-deiodanase is inhibited.
Annona squamosa L.	The aqueous leaf extract of *A. squamosa* was also reported to ameliorate hyperthyroidism, which is
Family: Annonaceae [25]	the major causative factor for diabetes mellitus.
Rauvolfia serpentina L. Benth .ex Kurz.	The *R. serpentina* root extract administered to T_4 induced hyperthyroid mice significantly decreased
Family: Apocynaceae [26]	both the serum T_3 and T_4 concentrations.
Emblica officinalis Gaertn.	The fruit extract decreased both serum T_3, T_4 concentrations. The decrease in T_3 was by inhibiting
Family: Phyllanthaceae [27]	peripheral conversion of T_4 to T_3 in extra-thyroid tissues.
Trigonella graceum L.	The seed extract induced reduction in T_3 level could be the result of inhibition in peripheral conversion
Family: Fabaceae [28]	of T_4 to T_3 in extra thyroidal tissues.
Aegle marmelos (L.)Correa	The plant has a specific role in the regulation of thyroid functions and in maintaining the Thyroid
Family: Rutaceae [29]	hormone levels..
Ocimum sanctum L.	The leaf extract of *O. sanctum* administered to male mice for significantly inhibited only T_4
Family: Lamiaceae [3]	concentration.
Moringa oleifera auct.non Lam	*M. oleifera* leaf extract treatment of female rats decreased serum T_3 concentration and increased in
Family: Moringaceae [30]	serum T_4 concentration .This observation suggests the inhibitory activity of the plant extract in the peripheral conversion of T_4 to T_3.

CONCLUSION

The herbal approach to thyroid dysfunction is invariably necessary to avoid the various side effects of hormonal therapy. There is need for *in-vitro, in-vivo* and clinical research of the above plants to further certify their efficacy in normalising thyroid dysfunction. This will provide the practitioners to have options to treat thyroid dysfunction.

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