A REVIEW ON THYROPROTECTIVE PLANTS

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Abstract: Thyroid impairment are rising dominantly in Indian Population in an alarming rate. Hypothyroidism as well as hyperthyroidism are the most common thyroid diseases in India. An important measure to thyroid abnormality is hormone replacement therapy. Herbal treatment to thyroid diseases are getting importance over hormone replacement. The aim of this review is to give information over herbs that has been tried over model organism or herbs that has been used traditionally for correction of thyroid dysfunction. About a number of 23 plants have been mentioned in this review which may have potential thyroprotective effects.

Keywords: Herbal medicine, Hypothyroidism Phytoestrogen, Tetraiodothyronine Triiodothyronine

1. Introduction:

Hypothyroidism and hyperthyroidism are two prevailing medical conditions of thyroid disorder. In developed countries, Autoimmune thyroid disease is the common form [1]. However, iodine deficiency is the major cause of hypothyroidism in many countries. Autoimmune disease Hashimoto's thyroiditis is the most common cause of permanent hypothyroidism. Excessive production of thyroid hormone from the thyroid gland is hyperthyroidism. Grave's disease is the most common cause of hyperthyroidism [2].

Thyroid hormone disorders refer to inappropriate production of thyroid hormone as well as thyroid hormone action [3]. The thyroid gland produces thyroxine (T4) which is transformed to the active form Triiodothyronine with the help of 5'-deiodinase in target cells [4]. Thyroid hormone is necessary for growth and development as well as metabolism in the animal body [5]. Thyroid hormones are also important for normal cell growth and development [6]. Amphibians need thyroid hormone for metamorphosis [7]. Thyroid hormones regulate basal metabolic rate [8]. Cardiovascular system, Skeletal system, central nervous system, adipose tissues are targets of thyroid hormones [9]. During the development of the nervous system increase or decrease supply of thyroid hormone leads to adverse abnormal conditions in the brain causing mental retardation [10,11]. Thyroid hormone receptors are present in myocardial and vascular endothelial tissues. These tissues are sensitive to thyroid hormones [12]. Hyper, as well as hyposecretion of thyroid hormone, affects cardiac contractility, blood pressure, systemic vascular resistance, myocardial oxygen consumption [13,14]. Lipolysis and lipogenesis both the system in the body is affected by thyroid hormone [15]. Hyperthyroidism increases the rate of oxygen consumption and hypothyroidism decreases the metabolic rate [16]. Menstrual disturbances in women have been reported in both hyperthyroidism and hypothyroidism [17,18]. Oligomenorrhea and menorrhagia are mostly experienced by hypothyroid women. Hyperthyroid women commonly have hypomenorrhea [18,19]. Normal functioning of reproductive system needs proper thyroid hormone level as T3 and T4 have a direct action on ovarian, uterine and placental tissue [20-22]. Alteration in serum TH level may cause infertility [23-25].

2. Treatment of thyroid dysfunction:

Methimazole, carbimazole, neomarcazole, propylthiouracil are used as antithyroid drugs for hyperthyroid conditions. Methimazole is a common drug to treat hyperthyroidism. Methimazole blocks the iodination of tyrosine in thyroglobulin by interfering with the action of thyroid peroxidase enzyme [26]. Propylthiouracil blocks TPO which converts iodide to iodine and adds iodine to tyrosine residues in thyroglobulin. PTU inhibits the production of MIT and DIT and thus decreases T3 and T4 production [27].

Although L thyroxine is used for the hypothyroid condition, it is not a drug that cures the disease, instead is a lifelong replacement therapy of thyroid hormone deficiency [28]. Interest for herbal medicine and plant bioactive compounds have renewed in recent days [29].

Herbal medication can be an alternate method for the treatment of thyroid diseases. Traditional medicine plays a spectacular role in the treatment of various diseases in Asian countries [30]. Various plants have been reported so far in the treatment of thyroid diseases. Ingestion of certain herbs can cause an imbalance in hormone levels in the body. Plants have phytoestrogens which affect the hormone level in the human body [31]. In India, the traditional system of medicine plays an important role in the health care of rural people for all types of ailments. The healing power of traditional herbal medicines has been realized and documented since Rigveda and Atharvaveda [32]. There are uncountable limitations of modern medicine. Researchers nowadays are trying to explore the traditional medicines that are used by the ayurvedic practitioner [33]. Plant - derived phenolic compounds having estrogenic effects are phytoestrogens [34]. Chemicals derived from plants may be beneficial or harmful to thyroid function. Phytoestrogen in soy food may affect thyroid function by inhibiting TPO [35]. Flavonoids are phytochemicals found in plants. Humans cannot synthesize flavonoids [36]. Flavonoids have been proven to be beneficial to the human body having antioxidant and anti-inflammatory properties. Flavonoids can affect thyroid function as reported in 1958 [37]. Flavonoids and isoflavones like genistein and daidzein in soybeans are proven to be goitrogenic in low iodine intake places [38]. Also, certain flavonoids like naringin, genistein, curcumin, rutin, quercetin are proven to be beneficial for the treatment of thyroid cancer [39]. Pentacyclic triterpenes like betulinic acid have properties of curing hypothyroid-related complications in experimental hypothyroidism [40]. Alpha and beta amyrin might have similar properties as betulinic acid [41]. The primary objective of this study is to review the possibilities of alternative remedies to drugs used for thyroid diseases.

Table 1: List of plant showing a remedial effect on hypothyroidism.

Sl. No.	Scientific name	Family	Common name	Parts used	Inferences	References
1	*Withania somnifera*	Solanaceae	Ashwagandha	Leaf	Increase in serum T4 level.	[42]
2	*Mangifera indica*	Anacardiaceae	Mango	Peel	Increase in both thyroid hormone T3 and T4.	[43]
3	*Zingiber officinale*	Zingiberaceae	Adrak , ada	Rhizome	Used for hypothyroidism	[44]
4	*Citrullus vulgaris*	Cucurbitaceae	Watermelon	Peel	Stimulates thyroid	[43]
5	*Cucumis melo*	Cucurbitaceae	Gurmi (wild muskmelon)	Peel	Stimulates thyroid by increasing T3 and T4 secretion.	[43]
6	*Linumusita tissimum*	Linaceae	Flaxseed	Seed	Helps in boosting production of thyroid hormone	[44]
7	*Centella asiatica*	Apiaceae	Gotu kola , Manimuni	Leaf	Gotu kola leaves are commonly recommended for hypothyroidism and it has a stimulatory effect on T4 synthesis	[42]
8	*Commiphora mukul*	Burseraceae	Guggulu	Resin	Stimulates thyroid	[42]
9	*Bauhinia purpurea*	Fabaceae	Kanchanara	Bark	Increase in production of serum T3 and T4 .	[45]
10	*Costus pictus*	Costaceae	Jam lakhuti	Leaf	C.pictus extract has potential to restore thyroid hormone levels and prevent the biochemical complications due to thyroid hormone	[41]

					insufficiency.	
11	*Crataeva nurvala*	Capparaceae	Barun	Bark	c. nurvala was found to be effective in treating hypothyroidism	[46]
12	*Bacopa monnieri*	Plantaginaceae	Brahmi	Leaf	Stimulates thyroid activity by increasing the amount of T4 useful in treatment of hypothyroidism	[47]

Table 2: List of plants showing remedial effect on hyperthyroidism.

Sl.no	Scientific name	Family	Local name	Part used	Inferences	References
1	*Aegle marmelose*	Rutaceae	Bael	Leaf	Have potential to regulate hyperthyroidism, lipid peroxidation.	[45]
2	*Aloe barbadensis*	Asphodelaceae	Aloe vera	Leaf	Treats hyperthyroidism	[47]
3	*Rauwolfia serpentina*	Apocynaceae	Sarpgandha , indian snakeroot	Roots	Helps in decreasing T3 and T4 in hyperthyroid condition	[45]
4	*Emblica officinalis*	Phyllanthaceae	Amla, amlakhi	Fruits	Helps decreasing T3 and T4 in hyperthyroid condition	[45]
5	*Moringa oleifera*	Moringaceae	Drumstick	Leaf	Decreased T3and increased T4	[48]
6	*Ficus racemosa*	Moraceae	Jagya dimoru or mou dimoru	Bark	It can possibly overcome hyperthyroidism.	[49]
7	*Trigonella foenum-graecum*	Fabaceae	Fenugreek , methi	Seeds	Helps in loweri ng T3 and T4 in hyperthyroidism.	[48]
8	*Allium sativum*	Amaryllidaceae	Garlic	Bulbs	Helps in loweri ng T3 and T4 in hyperthyroidism.	[48]
9	*Bauhinia purpurea*	Fabaceae	Kanchan	Leaf	Leaf extract posses significant antithyroidic and antiperoxidase activity.	[50]
10	*Beta vulgaris*	Amaranthaceae	Beet	Peel	The peel extract has potential to ameliorate hyperthyroidism.	[32]
11	*Annona squamosa*	Annonaceae	Custard apple	Seed	Have potential in regulation of hyperthyroidism.	[45]

3. Discussion:

From the history of man, medicinal plants are identified and used. Plants have different chemical compounds which can show effects on human health. Every herb and spices people eat as food definitely have some positive effects. The aim of the present review was to discuss herbal drugs that can be further studied and clinically tried in India over the thyroid diseases. Thyroid diseases are commonly occurring diseases now a days. This study gives a list of 23 plants which has been reported as thyrosuppressive or thyroid stimulating. Study have been done on

various models to test the efficacy of the plant. Along with the scientific names of the plants the local name or common names has been given for local awareness.

4. Conclusion:

Hormonal therapies have various side effects. Herbal approach to treatment of hormonal disorders are necessary. Thyroid diseases can be treated with herbal medicines to some extend depending upon symptoms. Herbal drugs not only cure the disease but also manages the defence system of body due to presence of antioxidants. Clinical research of the above mentioned plants may provide practitioners and researchers a new dimension to treat thyroid disorders.

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