

## REVIEW OF AYURVEDIC DRUGS ACTING ON HYPOTHYROIDISM

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## ABSTRACT

Thyroid problems are among the most common endocrine disorders presently seen worldwide. Hypothyroidism results when the thyroid gland fails to produce enough of the thyroid hormone, due to structural or functional impairment that significantly impairs its output of hormones, this leads to the hypo metabolic state of hypothyroidism. It is estimated to affect between 3.8-4.6% of the general population. The prevalence of primary hypothyroidism is 1:100, but increases to 5:100. The female-male ratio is approximately 6:1. There is no direct reference of thyroid in *Ayurvedic* classics, but *Galganda* and *Gandmala* have been frequently used in these classics. According to *Charaka* presentation of multiple *Granthi* around the neck is called *Gandmala* and single swelling on the *Parshava* of the neck is *Galganda*. So *Galganda* and *Gandmala* can be co-related with hypothyroidism. The incidence of hypothyroidism is increasing day by day, and there is increasing demand to treat the disease through the *Ayurvedic* system of medicine, as it is completely natural and safe. The root cause of hypothyroidism is disequilibrium of *tridosha*. In this article effort is made to review some *Ayurvedic* herbs for correction of imbalance in *tridosha* and flawed function of the thyroid gland.

**Keywords:** Hypothyroidism, *Galganda*, *Gandamala*, *Ayurvedic* herbs.

## INTRODUCTION

Thyroid problems are among the most common endocrine disorders presently seen worldwide. About 1 to 2% of the adult population is known to suffer from thyroid disorders.<sup>1</sup> According to the World Health Assembly report, about 1.5 billion persons in more than 110 countries are threatened with thyroid disorders. World Health Organization (WHO) estimation also indicates that about 200 million people have goiter, although most of the goiters are small and subclinical.

Thyroid is one of the earliest endocrine glands to build up<sup>2</sup>. It is an endocrine gland located in the neck below the thyroid cartilage (which forms the laryngeal prominence, or "Adam's apple"). It acts by producing thyroid hormones, the principal ones being triiodothyronine (T<sub>3</sub>) and thyroxine (T<sub>4</sub>). Both T<sub>4</sub> and T<sub>3</sub> are io-

dine-containing chemicals. Because they are the only iodine containing hormones in the body, an adequate iodine intake is necessary for the optimum functioning of the thyroid gland. Doctors recommend about 150 mg/day of iodine for normal thyroid function; less than 50 mg/day for a long period may cause goiter.<sup>3</sup>

Hypothyroidism generally describes an under-active thyroid that does not produce enough thyroid hormones causing an overall decrease in physical and mental activity. The disease is more prevalent in females around 6-8 times, between 40-50 years.<sup>4</sup> Hypothyroidism can result from a defect anywhere in the hypothalamic-pituitary-thyroid axis, either insufficient TSH from the pituitary or insufficient TRH from the hypothalamus. In the vast majority of cases, it is primary hypothy-

roidism, which is decreased secretion of thyroxine (T<sub>4</sub>) and triiodothyronine (T<sub>3</sub>) by the gland itself, which results in a compensatory increase in TSH secretion. Thus, the combination of a low serum T<sub>4</sub> and a high serum TSH concentration both confirm the diagnosis of hypothyroidism.

### Main causes of hypothyroidism:

The main causes of hypothyroidism can be classified<sup>5</sup> into:

1. Primary hypothyroidism- The most common cause of primary hypothyroidism is Iodine deficiency, AITDs (Autoimmune thyroid diseases), Iatrogenic causes, Drugs, Congenital etc.
2. Secondary hypothyroidism (due to pituitary TSH deficit).
3. Tertiary hypothyroidism (due to hypothalamic deficiency of TRH).

### Pathogenesis:

Thyroid hormone is required for the normal functioning of each and every tissue of the body, hence deficiency manifest as multi system involvement. The daily requirement of iodine recommended is 150ug/day, when there is iodine deficiency. The thyroid compensates by increasing the iodine trapping mechanism and synthesis of hormone under the influence of TSH. This results in diffuse enlargement of the gland, which later on becomes multinodular.<sup>6</sup> The onset and progression of disease is very gradual, the basal metabolic rate (B.M.R.) is decreased, deposition of haluronidase in dermis and all tissues and hence leading to non-pitting oedema i.e., myxoedema, which is the result of long lasting hypothyroidism.

### Symptoms:

Hypothyroidism is one of the most undiagnosed and misdiagnosed diseases, as its clinical features are notorious. The symptoms of hypothyroidism are quite variable, depending on the severity of the hormone deficiency and of course one's

constitutional make-up. Weakness, malaise, lethargy, and weight gain, peri-orbital puffiness are the early symptoms. It is followed by cold intolerance, loss of hair, skin changes consist of dry and scaly skin, nails become brittle, and hoarseness of voice and slowness of speech, constipation, irregular cycle, PCOD and infertility.<sup>7</sup>

### Ayurvedic perspective on hypothyroidism:

There is no direct mention of the thyroid gland in *Ayurveda*, but a disease by the name *Galaganda*, characterized by neck swelling, is well known. The first description of neck swelling was mentioned in *Atharva Veda* by the name *Apachi*. *Charaka* mentioned the disease under 20 *sleshma vikaras*<sup>8</sup>. *Sushruta* {renowned ancient Indian surgeon} in *Shareera Sthana* has mentioned that of the seven layers of the skin, the sixth layer *Rohini* is the seat of *Galaganda*<sup>9</sup>. In *Nidana Sthana* he described *Galaganda* as two encapsulated small or big swellings in the anterior angle of the neck, which hang like scrotum<sup>10</sup>, whereas *Charaka* mentioned *Galaganda* as a solitary swelling.<sup>11</sup>

The climatic conditions, water supply, dietary conditions, etc., are mentioned as the main aetiological factors. *Sushruta* stated that *Himvatprabhava* rivers might give rise to the occurrence of *Galaganda*<sup>12</sup>. *Bhela* described that *Sleepda* and *Galaganda* are more common in *prachya desa* (eastern part) of the country, and that persons consuming predominantly fish are liable to develop *Galaganda*. *Harita Samhitakara* described the role of *dushtambu* (contaminated water) and *krimi dosha* (infection) in the precipitation of *Galaganda*.<sup>13</sup> *Kashyapa Samhitakara* added that any part of the country that is cold, damp, with densely grown long trees, water stagnation and heavy rains

may be prone for the development of *Galaganda*.<sup>14</sup>

From the above descriptions it is tempting to associate *Galaganda* with goiter (abnormal swelling of the thyroid gland) where thyroid functions may or may not be compromised. But hypothyroidism is not just a localized disease. It has many symptoms related to many systems of the body. Thus it is probably inaccurate to draw a parallel between hypothyroidism and *Galaganda*.

#### Planning of treatment:

'Vikaranamakusalo na jihriyat kadachana Nahi sarva vikaranam namo-toasti dhrivasthitih'<sup>15</sup> -

*Ayurveda* doesn't emphasize the exact nomenclature of the diseases; rather it insists on diagnosis of the constitutional status of the disease as mentioned in *Charaka*.

Based on *Ayurvedic* principles, the following are the main treatments for hypothyroidism.

1. Genetical and hereditary defects come under *Adibala Pravritta Vyadhis*<sup>16</sup>, so no treatment is suggested.
2. Iodine deficiency is the main common cause for hypothyroidism. So '*Sarvadha sarva bhavanam samanyam vriddhikaranam*'<sup>17</sup> applies here.
3. Auto immunity is another common cause, so immuno modulatory drugs are recommended here.
4. If there is functional loss of thyroid tissue, or functional defects, thyroid stimulatory drugs are beneficial.

'*Samprapti vighatana*' is one of the main principles of treatment. Whatever may be the aetiology of the disease, it results in under-active condition of the thyroid gland and ultimately the slowing down of the body's metabolism. So the treatment should aim to stimulate the thyroid gland.

Here brief description is given of some important plants which are frequently used in management of hypothyroidism in present era:-

#### (1) **KANCHANARA:**

Latin Name - *Bauhinia variegata* Linn

Family- *Caesalpinaceae*

Rasa- *Kashaya* Guna- *Ruksha, Laghu*

Virya- *Sheeta* Vipaka- *Katu Karma-*

*kapha-Pittahara* Useful part-

Bark

*Kanchanara* is considered as a drug of choice for *Granthi vikara* and *Galaganda*.<sup>18</sup> External application of *kanchanara* bark is done in *Gandmala*. Fresh bark of *kanchanara* is grinded with *tandulodaka* and mix with *shunthi* and used internally.<sup>19</sup> It has a balancing activity on the thyroxin production, increasing any deficient production and decreasing any excess. It also clears swellings in the neck and goitre. It is a specific herb for swollen lymph nodes, cervical adenitis, scrophularia or swollen glands in general.

Water-soluble fraction of total alcoholic extract of *Bauhinia variegata* Linn at a dose of 2 g/kg was fed to Neomercazole (150 mg/kg)-induced hypothyroidic rats (n = 12 in each group) for 20 days. The experiment resulted in enhanced thyroid function as evidenced by increased thyroidal weight ( $p < 0.001$ ), I<sup>131</sup> uptake and decreased serum cholesterol ( $p < 0.05$  for both), and active thyroidal histology<sup>20</sup>

Bark extract of *Bauhinia purpurea* Linn. at 2.5 mg/kg orally administered to female mice (n = 7 in each group) significantly increased serum T3 and T4 concentrations ( $p < 0.001$  for both) after 20 days of treatment<sup>21</sup>

#### (2) **ASHWAGANDHA:**

Latin Name- *Withania somnifera* Linn

Dunal Family- *Solonaceae*

Rasa- *Katu, Tikta, Madhura* Guna-  
*Snigdha, Laghu* Virya- *Usna* Vipaka-  
*Madhura*  
 Karma- *Kapha-Vatahara* Useful  
 part- Root

*Ashwagandha* is an adaptogenic popular herb that has shown incredible results for lowering cortisol and balancing thyroid hormones. It has adaptogens which works well with the hormones of the endocrine system which brings balance to the thyroid hormonal level. It increases the hormones which are secreted by thyroid gland. *Ashwagandha* is a immunomodulator herb so it is useful in autoimmune thyroid conditions.

Animal studies reveal *Ashwagandha* has a thyroid hormone balancing effect. In a 20 day study mice were given *Ashwagandha* and their T<sub>3</sub> and T<sub>4</sub> levels were analyzed, along with lipid peroxidation (anti-oxidant protection). Significant increases in serum T<sub>4</sub> were found, which indicates this herb has a stimulatory effect on a sluggish thyroid.<sup>22</sup>

In another study, all three extracts (*B. purpurea*, *C. mukul*, and *W. somnifera*) were administered simultaneously to mice (n = 8) for 30 days at the doses mentioned above. The results showed an increase in both T<sub>3</sub> and T<sub>4</sub> levels ( $p < 0.01$  and  $p < 0.001$ , respectively), suggesting that a combination of the three plant extracts may prove to be an effective treatment for hypothyroidism.<sup>23</sup>

### (3)SHIGRU:

Latin name- *Moringa oleifera* Lam.  
 Family- *Moringaceae*  
 Rasa- *Katu, Tikta* Guna- *Ruksha*,  
*Laghu, Tikshna* Virya- *Usna*  
 Vipaka- *Katu*  
 Karma- *kapha-Vatahara* Useful  
 part- Root bark, seeds

*Shigru* seeds paste with *nichula* is applied locally in treatment of *Galaganda*.<sup>24</sup>

The aqueous leaf extract of *Moringa oleifera* Lam. was evaluated for its ameliorative effect in the regulation of thyroidism in rat model. Male albino rats of 120-150 g were treated orally with doses of 500mg/kg body weight (b.w.) and 250 mg/ kg b.w. of aqueous extract of *Moringa oleifera* Lam. leaf. The group which received maximum test dose (500mg/kg bw, 14days) showed maximum percentage increase in hormone concentration of T<sub>3</sub> and T<sub>4</sub> whereas a maximum percentage decrease in TSH levels was observed when compared to the other dose levels, which clearly proves that the response was dose effective and the *M. oleifera* leaf extracts can be used in hypothyroidism condition to normalize hormone levels<sup>25</sup>

### (4)VARUNA:

Latin name- *Crataeva nurvula* Buch-Ham.  
 Family- *Capparidaceae*  
 Rasa- *Tikta, Kashaya* Guna-  
*Ruksha, Laghu* Virya- *Usna*  
 Vipaka- *Katu*  
 Karma- *kapha-Vatahara* Useful  
 part- Bark, Root

Decoction of *Varuna* root is given with honey in treatment of *Gandamala*<sup>26</sup>. *Varuna* also possesses anti tumor property which makes it beneficial in extra growths of thyroid as well as in hyper trophy of prostate.

### (5)GUGGULU:

Latin name- *Commiphora mukul* (Hook ex Stocks) Engl. Family- *Burseraceae*  
 Rasa- *Tikta, Katu* Guna- *Ruksha*,  
*Laghu, Tikshna* Virya- *Usna*  
 Vipaka- *Katu*  
 Karma- *Vata-Kaphahara* Useful  
 part- Oleo resin/gum

*Guggulu* (the gum resin of *Commiphora mukul*) is reported to raise the triiodothyronine (T<sub>3</sub>)/thyroxine (T<sub>4</sub>) ratio in female mice<sup>27</sup> and reverse the effects of propylthi-

ouracil in hypothyroid mice by stimulating thyroid function.<sup>28</sup>

*Triphladya Guggulu gutika* is used in *Gandamala* which main content is *Guggulu*<sup>29</sup>

**(6)JALAKUMBHI:**

Latin name- *Pistia startiotes* Linn  
Family- *Araceae*

Rasa- *Tikta, Madhura* Guna- *Ruksha, Laghu*  
Virya- *Sheeta* Vipaka- *Madhura*

Karma- *kapha-Vatahara* Useful part- whole plant

*Jalakumbhi bhasma* is given with *gomutra* in *Galaganda*.<sup>30</sup>

*Jalakumbhi* is a widespread weed in rivers and lakes which is applied in paste form topically to reduce the swelling of Thyroid.<sup>31</sup>

**(7)BRAHMI:**

Latin name- *Bacopa monnieri* Linn.  
Family- *scrophulariaceae*

Rasa- *Tikta, Kashaya* Guna- *Laghu*  
Virya-*Sheeta* Vipaka-*Madhura*

Karma- *kapha-Pittahara* Useful part- Whole plant

*Brahmi* is very well known *Medhya* drug in *Ayurveda* classics. *Brahmi* Stimulates thyroid activity by increasing the amount of  $T_4$ , useful in treating hypothyroidism. It is one of the most important nervine herbs used in *Ayurvedic* medicine and helps to improve memory, concentration and detoxify the nervous system.<sup>32</sup>

*Bacopa monnieri* Linn (Indian pennywort) extract has been observed to increase both  $T_4$  and  $T_3$  levels in male mice.<sup>33</sup>

**(8)AARAGVADHA:**

Latin name- *Cassia fistula* Linn.  
Family- *Caesalpiaceae*

Rasa- *Madhura* Guna- *Mridu, Guru, Snigdha*  
Virya- *Sheeta* Vipaka- *Madhura*

Karma- *Vata-pittahara* Useful part- Root bark, leaves, flowers, fruit pulp

Root bark of *Aaragvadha* is grinded with rice water and used for *Nasya* and *Lepa* in treatment of *Gandamala*.<sup>34</sup>

Aqueous and ethanolic extract of *Cassia fistula* Linn leaves were investigated for its potential to protect hypothyroidism against hypothyroidism induced by propylthiouracil (PTU) in rats. Serum  $T_3$ , serum  $T_4$ , TSH, cholesterol level and changes in body weight were used for evaluation of antihypothyroidism activity. Treatment with both extracts of *Cassia fistula* in dose of 300 mg/kg significantly increased serum  $T_3$ , serum  $T_4$  and decreased TSH and cholesterol level compared with control group<sup>35</sup>

**(9)APAMARGA:**

Latin name- *Achyranthes aspera* Linn  
Family- *Amaranthaceae*

Rasa- *Tikta, Katu* Guna-*Laghu, Ruksha, Tikshna*  
Virya- *Ushna* Vipaka- *Katu*

Karma- *Kapha-Vatahara* Useful part- Whole plant

*Achyranthes aspera* Linn. leaf extract administered in rats (n = 7) at a dose of 200 mg/kg for 7 days caused an increase of  $T_3$  and  $T_4$  ( $p < 0.001$  for both). An increase in blood glucose in this group ( $p < 0.05$ ) further supported the extract's thyroid-stimulating nature.<sup>36</sup>

**(10)NIRGUNDI:**

Latin name- *Vitex nigundo* Linn  
Family- *Verbenaceae*

Rasa- *Katu, Tikta* Guna- *Laghu, Ruksha*  
Virya- *Ushna* Vipaka- *Katu*

Karma- *Kapha-pittahara* Useful part- Root, leaves, seeds

Root of *Nirgundi* is grinded with water and used for *Nasya* in treatment of *Gandamala*.<sup>37</sup>

*Taila*, which is prepared by *Nirgundi sva-rasa* and paste of *Langali* root, is used for *Nasya* in treatment of *Gandamala*.<sup>38</sup>

## DISCUSSION

Hypothyroidism is common disorder now a days. Many modern medicinal therapies and medicines are available for the treatment of this disease but these are not devoid of side effects and the re-occurrence rate is also high. It is very important to show an interest in indigenous system of medicine and traditional herbal remedies which are regarded as quite safe with no side effects and are cost effective.

Hypothyroidism is often correlated with *galganda* mentioned in *Ayurvedic* literature. Treatment often includes herbs like *Kanchnara*, *Shigru*, *Varuna*, *Apa-marga*, *Brahmi*, *Jalakumbhi*, *Ashwagan-dha*. These herbs have also been tested in various experimental models and proved efficacious. But still the mainstay for the *Ayurvedic* treatment of Hypothyroidism is *samprapti vighatan* (breaking of pathogenesis) of the disease and *Lakshana pratyantik* (symptomatic treatment). These *Ayurvedic* herbs not only provide relief in various symptoms but also directly alter the secretions of the different hormones involved in pathogenesis of the disease and stimulate the normal functioning of thyroid gland.

## CONCLUSION

From this review we conclude that hypothyroidism can be very well managed with *Ayurvedic* medicines, depending upon the symptoms, and careful selection of drugs to be made. Herbal extracts possess natural antioxidants, which not only help in curing the diseases, but also improve the body's defense system. So *Ayurveda* based herbal remedies should be preferred for the management of Hypothyroidism.

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