

Conceptual insights into thyroid disorders: mechanisms and clinical implications

Harshal Shende

MD [Rasashastra and Bhaishajyakalpana]

Doctor Kabir Saheb's Thyroid Research Institute- India

Author Correspondence: 7021091160; drharshal8393@gmail.com

ABSTRACT:

Endocrine disorders are increasingly prevalent in India, with thyroid disorders constituting a significant proportion of these conditions. The incidence of thyroid dysfunction is escalating at an alarming rate among the Indian population, with hypothyroidism and hyperthyroidism representing the most common forms. These disorders typically arise due to structural or functional impairments that hinder the thyroid gland's ability to produce adequate amounts of thyroid hormones.

Given the rising prevalence of thyroid-related conditions, there is a growing need to explore and promote Ayurvedic approaches to treatment, which are considered safe, natural, and holistic. This article aims to review various Ayurvedic interventions—including lifestyle modification, dietary changes, pranayama and yoga—that focus on

balancing the *tridoshas* and restoring optimal thyroid function.

Keywords: - Endocrine, Thyroid, Hypothyroidism, Hyperthyroidism, Ayurvedic, Hormone, *tridoshas*

INTRODUCTION: -

Thyroid disorders represent a significant global health concern, with a steadily increasing prevalence. According to the American Thyroid Association (ATA), over 12% of the U.S. population is expected to develop a thyroid disorder during their lifetime, with an estimated 20 million individuals already affected. Notably, women are five to eight times more likely to develop thyroid dysfunction compared to men. In the Indian context, a 2011 study reported approximately 42 million individuals living with various forms of thyroid disease.

Thyroid disorders are among the most prevalent endocrine conditions observed

in the modern world. Under normal physiological conditions, the thyroid gland plays a critical role in regulating body metabolism through the secretion of thyroid hormones. When these hormones fail to maintain a balanced metabolic rate, two primary clinical manifestations may arise: hypothyroidism and hyperthyroidism.

In classical Ayurvedic literature, no specific nomenclature exists for hypothyroidism or hyperthyroidism. Such conditions fall under the category of *Anukta Vyadhi*, referring to diseases not explicitly mentioned in ancient Ayurvedic texts^[1] Despite this, these disorders can be interpreted and addressed through the Ayurvedic diagnostic framework of *Trividha Bodhya Sangraha*, which comprises *Vikara Prakriti* (nature of the disease), *Adhithana* (site of pathology), and *Samuthana* (etiological factors). This foundational understanding allows for effective management of thyroid dysfunction using Ayurvedic principles.

In contemporary society, a significant number of individuals are affected by thyroid imbalances, which are often attributed to factors such as poor dietary habits, chronic stress, indiscriminate use of medications—including oral contraceptives and long-term antibiotics—genetic predisposition, and sedentary lifestyles. These contributors can disrupt the normal functioning of the thyroid gland, leading to systemic imbalances. Common clinical manifestations of thyroid dysfunction include fatigue, unexplained weight gain or loss, hair fall, exophthalmos (bulging

eyes), mood fluctuations, depression, menstrual irregularities, and infertility.

ANATOMY AND PHYSIOLOGY OF THYROID GLAND: -

The thyroid gland is a vital endocrine organ located in the anterior region of the neck, extending from the level of the cricoid cartilage to the suprasternal notch, anterior to the trachea. Anatomically, it comprises two lateral lobes connected by a thin isthmus and typically weighs between 12 to 20 grams, measuring approximately 5 cm × 2.5 cm × 2.5 cm. It is a highly vascular and soft glandular structure situated deep within the neck.

Histologically, the thyroid gland is composed of numerous spherical follicles lined by thyroid follicular cells. These follicular cells are responsible for synthesizing and secreting the thyroid hormones triiodothyronine (T3) and tetraiodothyronine (T4, commonly known as thyroxine). Interspersed among the follicular cells are parafollicular cells (also known as C cells), which produce the hormone calcitonin. Both T3 and T4 are iodine-containing derivatives of the amino acid tyrosine and are critical for the regulation of metabolic processes.

Of the two hormones, approximately 90% of the total thyroid hormone output is in the form of T4, which serves primarily as a prohormone.^[2] T3, although secreted in smaller quantities, is the biologically active form and exerts the majority of the physiological effects associated with thyroid hormone activity.

LITERATURE REVIEW: -

Although functional thyroid disorders are not explicitly mentioned in any of the classical Ayurvedic texts, the condition known as *Galaganda* is well described. However, the systemic manifestations associated with functional thyroid dysfunction are not outlined in relation to *Galaganda* in the *Charaka Samhita*—the oldest among the *Brihatrayi*—nor in the *Sharngadhara Samhita*, one of the latest classical treatises.

A symptomatologic analysis suggests that clinical presentations of thyroid disorders may be interpreted in Ayurveda through the lens of various conditions such as *Pandu* (anemia), *Atisthauya* (obesity), *Shopha* (edema), and *Grahani* (malabsorption syndrome), among others.

The earliest references to swelling in the neck region can be traced back to the *Atharvaveda*, where it is termed *Apachi*. *Charaka* categorized this condition under the twenty types of *Shleshma (Kapha)* disorders.^[3] *Sushruta* further elaborates on the anatomical basis of the disease, identifying the sixth layer of the skin—*Rohini*—as the site of manifestation (Adhithana) for *Galaganda Roga*.^[4]

THYROID DISORDER - CATEGORIZATION: -

Thyroid disorders are broadly classified into 2 sections: -

A] Functional type: -

1} Hypothyroidism

2} Hyperthyroidism

Structural type: -

1} Thyroid Nodules

2} Thyroiditis

3} Goiter

4} Ectopic Thyroid

5} Thyroid Cancer

Functional type of Thyroid Disorder is maximum affecting our Society.

Table: -

Following table illustrates Symptoms seen in Hypothyroidism and Hyperthyroidism:

HYPOTHYROIDISM	HYPERTHYROIDISM
Weight gain	Weight loss
Depression	Anxiety
Constipation	Raised Bowel movements
Cold and dry Skin	Warm and Smooth Skin
Normal Appetite	Increased Appetite
Cold Intolerance	Heat Intolerance
Calmness	nervousness
Drowsy	Sleeplessness
Confused/ Dull	Normal Mental competence
No Tremors	Tremors
Bradycardia	Tachycardia
Puffiness or oedema seen	No puffiness or oedema
Decreased pulse rate	Increased pulse rate

Cramps and aches	Weakness/ fatigue
Indigestion	Fast digestion
Decreased perspiration	Increased perspiration
Brittle nails	Increased nail growth
High Cholesterol	Low Cholesterol
No palpitation	palpitation
Anemia ^[5]	

DISCUSSION: -

According to *Acharya Charaka*, it is not essential for every disease manifestation to possess a specific nomenclature. Rather, the emphasis should be placed on understanding the underlying pathogenesis of the condition through the analysis of key factors such as *dosha*, *dushya*, and other contributing elements. Once the pathological basis is accurately identified, appropriate and effective treatment can be administered, irrespective of the disease having a designated name.

Hypothyroidism – Ayurvedic approach

Patients with hypothyroidism typically exhibit symptoms associated with the aggravation (*vrddhi*) of *Kapha*, *Vata*, and *Medo Dhatu* according to Ayurvedic principles. The vitiation of *Kapha* dosha manifests as clinical features such as cold intolerance, generalized fatigue, weight gain, reduced metabolic activity, bradycardia, and musculoskeletal discomfort. In parallel, the aggravation

of *Vata* dosha is reflected in symptoms such as cold intolerance, insomnia, mood disturbances including depression and low self-esteem, joint pain, and constipation. These observations highlight the multidimensional nature of hypothyroidism, encompassing both physical and psychological symptoms rooted in doshic imbalances.

Samprapti: -

A]: -Vitiation of *Vata* and *Kapha* by their causative factors

B]: - Vitiating the *Medo dhatu*, thereby vitiating the *Medovaha srotas* here, it is the thyroid gland, hence reducing its functional activities.

C]: -Causing decreased secretion of hormones with or without the gland enlargement.

Clinical Correlation Between Hypothyroidism and *Pandu Roga*: -

In general, patients with hypothyroidism present with symptoms that closely resemble those of *Pandu Roga* as described in Ayurvedic texts. Common clinical features include generalized weakness, cold intolerance, hair loss, reduced metabolic activity, exertional dyspnea, depressive symptoms, and diminished self-worth or low self-esteem.

According to Ayurvedic understanding, *Pandu Roga* is primarily associated with *Kapha* vitiation, which subsequently affects the *Rakta Dhatu*, leading to a decline in the quality of *Rakta*. This disturbance results in impaired function of the *Jatharagni* and *Dhatvagni* (digestive and tissue metabolic fire,

respectively). The *Dhatvagni Mandya* (reduced metabolic activity at the tissue level) across all *Dhatus* contributes to *Ojo-Kshina* (reduced vitality), a characteristic feature frequently observed in *Pandu Roga*^[8]

Clinical Correlation Between Hypothyroidism and *Ojaksinatva*: -

Ojas is considered the quintessential essence derived from the optimal nourishment and transformation of all the dhatus (bodily tissues). A depletion of *Ojas* (*ojokshayatva*) may result from various lifestyle and physiological factors such as excessive eating, prolonged fasting, sleep deprivation, overexertion, and emotional disturbances.

Despite the common presentation of weight gain in individuals with hypothyroidism, these patients often exhibit clinical signs of anemia and other features consistent with *Pandu Roga* (a condition comparable to anemia in Ayurveda). This suggests that in hypothyroidism, there is a generalized hypoactivity (*mandya*) of the *Jatharagni* (digestive fire) as well as the *Dhatvagnis* (metabolic processes associated with individual tissues), leading to impaired tissue metabolism and suboptimal formation of *Ojas*.

Clinical Correlation Between Hypothyroidism- *Atisthaulya* and *Pramehapurvarupa*: -

In the pathological condition of *Atisthaulya* (obesity), vitiation of Kapha Dosha and *Meda Dhatu* leads to the formation of an obstructive coating (*Avarana*) over the *Srotas*

(microchannels) of other *Dhatus* (tissues). This obstruction impairs the proper nourishment of subsequent *Dhatus*, resulting in the exclusive increase of *Meda Dhatu* while the other tissues remain undernourished.

In conditions such as hypothyroidism, this pathophysiology is reflected clinically. Despite a marked tendency towards weight gain, patients often present with symptoms such as anemia and generalized weakness, indicating compromised tissue nutrition.^[6]

The manifestations of *Meda Dhatu Vridhhi* (pathological increase of adipose tissue) encompass both the signs of *Atisthaulya* and the *Purva Rupa* (prodromal symptoms) of *Prameha* (a disorder analogous to diabetes mellitus). These prodromal features may include joint laxity (*Sandhi Saithilya*), excessive perspiration (*Ati Sveda*), coating of the tongue, ears, and eyes, as well as burning sensations in the hands and feet.^[7]

Clinical Correlation Between Hypothyroidism and *Agni*: -

Agni, a fundamental concept in Ayurveda, refers to the metabolic fire responsible for the processes of digestion, absorption, assimilation, and transformation of energy within the body. The term *paka* denotes the biochemical transformation of substances, and *Agni* is the agent facilitating this process. It is described by the term *nayate parinamyati*, which signifies its transformative function.

In Ayurvedic physiology, *Agni* is classified into three primary types:

Jatharagni – Governs the primary digestion within the gastrointestinal tract (GIT).

Bhutagni – Responsible for the further transformation of digested food at the elemental level, primarily in the liver. There are five types of *Bhutagni* corresponding to the five elements (*Panchamahabhuta*).

Dhatvagni – Facilitates the metabolism at the tissue (dhatu) level. There are seven *Dhatvagni*, each corresponding to one of the seven bodily tissues (dhatus).

Agni plays a central role in maintaining health, regulating physiological functions such as digestion, strength, complexion, immunity, enthusiasm, vitality, and overall well-being.^[9] A balanced state of *Agni*, known as *Samagni*, indicates optimal functioning and is maintained when the three doshas (*Vata*, *Pitta*, and *Kapha*) are in equilibrium.

When *Agni* is disturbed, it manifests in three pathological states:

Mandagni (hypo functioning of *Agni*) – Predominantly due to *Kapha* imbalance.

Vishamagni (irregular *Agni*) – Attributed to *Vata* imbalance.

Tikshnagni (hyperfunctioning *Agni*) – Typically caused by *Pitta* imbalance.

Among these, *Mandagni* leads to improper digestion and the formation of *Ama*—a toxic, undigested metabolic byproduct—which is considered a primary etiological factor in numerous diseases. *Ama* produces various systemic symptoms, including:

Srotorodha (obstruction of bodily channels),

Balabhramsa (loss of strength),

Gaurava (heaviness in the body),

Anilamudata (disturbed *Vata* movement),

Aalasya (lethargy),

Apakti (indigestion),

Nisthiva (excessive salivation),

Malasanga (constipation),

Aruchi (loss of appetite or taste),

Klama (fatigue or exhaustion).^[10]

Upon clinical evaluation, these symptoms are found to closely parallel the symptomatology of hypothyroidism. This suggests a strong correlation between *Ama* production and the clinical manifestations observed in hypothyroid patients. The hypothyroid condition can thus be interpreted through an Ayurvedic lens as a result of *Agni Mandya* (suppressed digestive fire) and *Medo Dhatu Vriddhi* (abnormal increase in adipose tissue), predominantly due to the vitiation of *Kapha* and *Vata* doshas.

In conclusion, the Ayurvedic pathophysiology (*samprapti*) of hypothyroidism involves a complex interplay between *Kapha* and *Vata* dosha imbalance, leading to suppressed *Agni* and subsequent *Ama* formation, resulting in metabolic dysfunctions analogous to those observed in clinical hypothyroidism.

Hyperthyroidism: An Integrative ayurvedic Perspective: -

Hyperthyroidism is a clinical condition characterized by the excessive or, at times, normal production of thyroid hormones by the thyroid gland, accompanied by increased serum iodine levels or heightened iodine uptake. Biochemically, it presents with elevated serum levels of thyroxine (T4) and triiodothyronine (T3), along with suppressed levels of thyroid-stimulating hormone (TSH). The clinical manifestations of hyperthyroidism are primarily attributed to the enhanced metabolic activity driven by the action of thyroid hormones, particularly T3.

From an Ayurvedic standpoint, hyperthyroidism exhibits feature consistent with *Doshavyadhi Lakṣaṇa*, with a predominance of *Dhatu Kṣaya Lakṣaṇa*, unlike the *Dhatu Sanchaya* observed in hypothyroidism. The principal dosas implicated in hyperthyroidism are *Vāta* and *Pitta*.

The *Vāta*-dominant symptoms include *Kārśya* (emaciation), *Kārṣṇya* (dark complexion), *Gātra Kampana* (tremors), *Spuraṇa* (muscle fasciculations), and *Pralāpa* (incoherent speech). These symptoms align with *Vāta* doṣa vrddhi (aggravation of *Vāta*).[11]

In contrast, the features of *Pitta* doṣa vrddhi include *Glāni* (malaise), *Indriya Daurbalya* (weakness of sensory functions), *Dāha* (burning sensations or hot flushes), *Tṛṣṇā* (excessive thirst), and *Pīta Tvak* (yellowish discoloration of the skin).[12]

Therefore, it can be conclusively interpreted that hyperthyroidism is primarily associated with the aggravation of *Vāta* and *Pitta* dosas. Additionally, considering that the thyroid gland is a *Medo Dhātu Pradhāna Granthi* (an organ predominantly composed of adipose tissue), the affected *duṣya* in hyperthyroidism is the *Medo Dhātu*.

Samprapti (Pathogenesis) in Hyperthyroidism: An Ayurvedic Perspective

Step 1: The vitiation of *Vata* and *Pitta* doshas leads to the subsequent vitiation of *Medo Dhatu* (adipose tissue). This pathological interaction initiates a dysfunction in the metabolic processes associated with *Medas*.

Step 2: As a result, there is an increase in *Medo Dhatvagni* (the metabolic activity specific to *Medo Dhatu*), along with the ongoing vitiation of *Medas*. In conditions such as hyperthyroidism, this manifests clinically as *Medo Dhatukṣaya* (depletion of adipose tissue).[13]

According to the classical text *Ashtanga Hridaya*, the characteristic features of *Medo Kṣaya* include:

Plihovṛiddhi (splenomegaly)

Katisvapna (numbness or hypoesthesia in the pelvic region)

Sandhiśūnyatā (reduced synovial fluid in joints)

Aṅgarūkṣatā (dryness of the body)

Karśya (emaciation or leanness)

Śrama (fatigue upon exertion)

Śoṣa (progressive wasting or cachexia)

Medura Māmsābhilāṣa (craving for red meat)

Additionally, signs and symptoms of *Māmsa Kṣaya* (depletion of muscle tissue) are also observed concurrently with those of Medo Kṣaya.

Hyperthyroidism and Atyagni: -

In this context as well, *Jatharagni* plays a pivotal role. Unlike in hyperthyroidism, where metabolic disturbances are primarily due to endocrine imbalance, here the *Agni* is vitiated by both *Pitta* and *Vata* doshas. Since *Agni* shares similar qualities with *Pitta*, it is often considered to be an expression or function of *Pitta* itself. When *Agni* is aggravated by *Pitta* and *Vata*, its activity becomes excessively intensified.

This hyperactive state of *Agni* is referred to as *Atyagni*, characterized by an abnormally high digestive capacity, which not only digests ingested food but also begins to consume bodily tissues (*Dhatus*) and *Ojas* (the vital essence), leading to systemic depletion.

The clinical manifestations of *Atyagni* include excessive thirst (*Trṣṇā*), cough (*Kāsa*), burning sensations and hot flushes (*Dāha*), and episodes of unconsciousness (*Mūrcchā*). Patients often report generalized malaise and fatigue.[14] Interestingly, there is a transient sense of relief and improved strength immediately after food intake; however, this is followed by increasing weakness as digestion progresses.

Treatment module for Hypothyroidism: -

Therefore, the therapeutic approach should focus on enhancing both *Jatharagni* and *Medodhatvagni*, while simultaneously pacifying *Vata* and *Kapha* doshas. Accordingly, the selected interventions should possess *pachana* (digestive), *Deepana* (appetizer), and *Medo-Kapha-Vatahara* (alleviating fat tissue, *Kapha*, and *Vata*) properties.

Treatment module for Hyperthyroidism: -

The treatment of hyperthyroidism can be formulated with the objective of pacifying the vitiated *Vata* and *Pitta* doshas, regulating the heightened *Jatharagni* and *Dhatvagni* (digestive and tissue metabolic fire), and alleviating the clinical manifestations associated with *Medo-Mamsa Kshaya* (depletion of adipose and muscular tissues).

Dietary Modification

	Hypothyroidism	Hyperthyroidism
Pathya	<i>Vata</i> kaphahara diet: - Oats, banana, Drumstick, Brown rice	<i>Pitta</i> vathara diet: - Dairy products, cabbage, cauliflower, broccoli etc. Protein rich diet
Apathya	Broccoli, cabbage, cauliflower, Soya, sweet potato, Pearl millet	Caffeine,
	Water containing chlorine	Iodine Rich food

Lifestyle Modification: -

	Hypothyroidism	Hyperthyroidism
Pathya	Daily morning walk	Day sleep
	Adequate sleep	
	Warm up exercises	
Apathya	Smoking	<i>Ratrijagrana</i>
	Day sleep	

CONCLUSION: -

The concept of *Agni* (digestive and metabolic fire) and its diverse functions at various physiological levels play a vital role in maintaining homeostasis and regulating the overall functioning of the body. The preservation and proper regulation of the *Agnisamuccaya* (the collective integrity of all forms of *Agni*) are essential for sustaining health. Ensuring the optimal functioning of *Agni* is fundamental not only for physical well-being but also for the holistic enjoyment of life's various dimensions.

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