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PRIMARY HYPOTHYROIDISM AS RASADHATHVAGNIMANDHYA VIKARA – A CONCEPTUAL STUDY

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ABSTRACT

Hypothyroidism is a disease condition, when the thyroid gland fails to produce enough thyroid hormones, due to structural or functional impairment and the reduction of these hormones results in decreased metabolism of the body. A study conducted on "Status of thyroid function in Indian adults' shows that 1 in 100 of the world population has primary hypothyroidism. Prevalence of primary hypothyroidism in the general population ranges from 3.8% - 4.6%. The female-male ratio is approximately 6:1. The metabolism of the body can be compared with the *Dhathuparinama* which is controlled by the *Dhathvagni*. The clinical features of hypothyroidism may be compared with the features of *RasapradoshajaVikara*, which occurs due to *RasadhathvagniMandya*. This leads to *Rasadushti* and further leads to over production of *Rasadhathu Mala* that is *Malaroopakapha*. This *Rasadhathvagni Mandya* and *Kaphavrddhi* affect further *Dhathuparinama* which may lead to vitiation of other *Dhathu* and produce many diseases. Hence *Dushti* of *Rasadhathu* plays a major role in pathogenesis. Here an attempt to correlate thyroid hormones as *Rasadhatvagni* has been made due to the similarity of their physiological functions and it is being explained at the levels of body metabolism, weight, growth, similar actions of thyroid hormone and *Dhatvagni* on different systems of body like respiratory system, nervous system etc. which shows hypothyroidism as a *Rasadhatvagnimandhya Vikara.*

Keywords: Primary hypothyroidism, Thyroid hormones, *Rasadhatvagnimandhya Vikara*

INTRODUCTION

Thyroid is one of the earliest endocrine glands to build up and it is located in the neck below the thyroid cartilage (which forms the laryngeal prominence/Adam's Apple). It acts by producing thyroid hormones Triiodothyronine (T3) and Thyroxin (T4).[1] These hormones play a critical role in cell differentiation during development and help in maintaining thermogenic and metabolic homeostasis in the body. Deficiency of these

hormones is known as hypothyroidism.[1] Hypothyroidism can result anywhere in the hypothalamo-pituitory axis, either insufficient TSH (Thyroid Stimulating Hormone) from the pituitary or insufficient TRH (Thyrotropin Releasing Hormone) from the hypothalamus.[2]Thyroid problems are one among the most common endocrine disorders presently seen worldwide**.** Hypothyroidism is a disease condition, when the thyroid gland fails to produce enough thyroid hormones, due to structural or functional impairment and the reduction of these hormones results in decreased metabolism of the body**.**[14]. When hypothyroidism develops due to the diseases or causes that primarily affect thyroid gland it is called primary hypothyroidism[4].When the hypothyroidism develops due to a defect outside the thyroid gland it is called secondary hypothyroidism and tertiary hypothyroidism. In the vast majority of cases it is primary hypothyroidism, which is decreased secretion of T4 and T3 by the gland itself, which results in a compensatory increase in TSH secretion.[3]In this situation serum T4 is low and TSH is elevated. Measurements of serum T3 are unhelpful since they do not discriminate reliably between euthyroidism and hypothyroidism.[3] Patients with elevated TSH levels (usually 4.5-10.0 mIU/L) but normal T3 and T4 levels are considered to have mild or subclinical hypothyroidism. This may persist for years and there is a risk of progression to overt hypothyroidism, which means later unbound T4 levels fall and TSH rise further; symptoms become more readily appear to clinical or overt hypothyroidism. [3]

The symptoms of hypothyroidism are tiredness, weakness, dryskin, feeling cold, hairloss, difficulty concentrating and poor memory, constipation, weight gain with poor appetite, hoarse voice, menorrhagia (later oligomenorrhea or amenorrhoea),paraesthesia and impaired hearing and the signs are dry coarse skin, cool peripheral extremities, puffy-face, hands and feet (myxedema), diffuse alopecia, bradycardia, peripheral oedema, delayed tendon reflex relaxation, carpel tunnel syndrome, serous cavity effusions.

Dhatwagni: All the seven *Dhatu* contain their own *Agni* to metabolize the nutrient materials supplied to them through their own *Srotas*. The seven *Dhatwagni*are *Rasadhatvagni, Raktadhatvagni, Mamsadhatvagni, Medodhatvagni, Asthidhatvagni, Majjadhatvagni* and *Shukradhatvagni*. By virtue of these respective seven categories of *Agni*, *Dhatu* undergo metabolic transformation in two different ways, viz. *Kitta-Paka* (transformation of waste products) and *PrasadaPaka* (transformation of nourishing material).It is the nutrient fraction of *Dhathu* that provides nourishment of the other tissues in succession. Each *Dhatvagni* has got a specialty to synthesize and transform the constituents suitable to its particular*Dhatu*. Explaining briefly the digestive and metabolic functions of *Agni, Acharya Charaka* has mentioned that various types of dietetic materials are digested by their own *Agni (Bhutagni),* encouraged and enhanced by *Antaragni (Jatharagni),*which is further digested and metabolized by *Dhatvagni* to associate the body with the nutritional strength, complexion and happy life along with providing energy to the seven *Dhatu.* As the thyroid gland secretes hormones which controls the metabolism, reduction of these hormones result in decreased metabolism, which can be compared with the *Dhathvagnimandya* condition. So, these hormones may be compared with *Dhathvagni* in Ayurveda. *Dusti* of *Rasa Dhathu* plays a major role in pathogenesis. Many of the *Rasadushtivikara* which have been mentioned in *Charaka Samhitha* are similar to the clinical features of hypothyroidism.[11]*Rasa Dhathvagnimandya* leads to *Rasavriddhi* and over production of *Mala* of *Rasadathu* that is *Malaroopa Kaphavriddhi*.[11] Due to *Rasadhathvagnimandya, Dhathuparinama* will not occur which means that the further metabolism is disturbed. This *Rasadhathvagnimandhya* and *Kaphavriddhi* associated with vitiated *Vata* will produce further vitiation of other *Dhathu*.

Samprapti

Due to *Kapha Pradhana Aharaja* and *Viharaja Nidana* there will be *Agnimandhya*, primarily *Rasadatvagni Mandhya* and *Rasavahasrotodusti*. The *Rasa* formed will be *Samarasa* due to *Rasavahasrotodusti* and from *Samarasa*, *Samakapha* is formed. This *Samakapha* gets located in the *Kanda* (*Samakapha Kanda Desheshu Avathistade*) and causes *Srotorodha* there. And *Rasadhatvagni Mandhya* causes *Utta-*

rottaradhatu Vaishamya to produce the symptoms which have been explained below.

Table 1: Common Symptoms in Hypothyroidism and *Rasadusti*

Hypothyroidism	***Rasavahasrotodusti***
Lack of concentration	*Asraddha*
Loss of appetite	*Aruchi*
Heaviness	*Gourava*
Lethargy	*Tantra*
Body pain	*Angamarda*
Anaemia	*Pandutvam*
Constipation, Cold intolerance, paraesthesia, myxedema, peripheral oedema, delayed tendon reflex relaxation, carpel tunnel syndrome and serous cavity effusions	*Srotorodha*
Infertility	*Klaibyam*
Poor digestion	*Agnimandhya*

Table 2: This *Rasavaha Srothodusti* affects further *Dhatuparinama* to produce symptoms in other *Dhathu* to produce the following symptoms

Raktha	Bradycardia, Hypotension, Dryness of The Skin, Lethargy
Mamsa	Muscle pain (*Mamsaruk*), *Galagandam* (nodule formation like MNG)
Meda	*Sthoulya* (obesity), Tiredness, Sleepiness, Hyperlipidemia
Asthi	Osteoporosis, Hair loss
Majja	Joint pain
Sukra	Loss of libido, Menstrualirregularities, Infertility

DISCUSSION

Comparison on Physiological Effect of Thyroid Hormone as *Dhatwagni*

General Effect on Basal Metabolic Rate[5]: The metabolism of a cell depends on the rate of its oxygen consumption. Oxygen is essential for oxidative phosphorylation of ADP (Adenosine Diphosphate**)** to ATP (Adenosine Triphosphate) that takes place in mitochondria. Thyroid hormones increase the basal rate of oxygen consumption and therefore, the basal metabolism of the tissues. This increased metabolism increases the rate of heat production. This is called calorigenic or thermogenic actions of thyroid hormones. Due to the deficiency of thyroid hormones the basal metabolic rate is decreased in hypothyroidism.

*''Ojasthu Tejo Dhatunam Sukranthanam Param Smritam'',*when proper *Dhatvagni* is formed from the proper *Jatharagni* and *Bhutagni, Poshana* of all *Dhatu* occurs in the right time in the right way which helps in increasing the *Ojas* and causes ''*Tustipustibalodaya'',* as *Ojavyapat* occurs in hypothyroidism there will be decreased *Tusti, Pusti* and *Bala* of the patient which may be compared with the decreased basal metabolic rate

Effect on Metabolism: Thyroid hormone is essential for the proper metabolism of carbohydrate, protein, lipid, plasma liver fats and in vitamin metabolism. For example,

1. In hypo secretion of thyroxine, the cholesterol level in plasma increases, resulting in atherosclerosis.
2. Hyposecretion of thyroxine also increases deposition of fats in the liver, leading to fatty liver.
3. Vitamin deficiency occurs in hyposecretion of TSH. The proper state of *Agni* is essential for the proper *Pachana* of *Ahara*. *Dhatwagni* depends upon *Jatharagni* and therefore *Agni* should be maintained in the proper state particularly at *Jatharagni* level. Any kind of *Agnimandhya* will leads to formation of *Kittamsha* rather than *Saramsa* of *Dhatu* and this *Malasanchaya* affects the further metabolism of the body.

Effect on Growth[7]: Thyroid hormones have general and specific effects on growth. In hypothyroidism there is decrease in thyroxine secretion which decelerates the growth of the body, especially in growing children.

The proper formation of *Rasa Dhatu* is essential for the proper growth of the body. Due to *Rasadhatvagnimandya* further *Dhatu Poshana* will get affected which results in impaired nourishment and growth of further *Dhatu.*

Effect on Body Weight.[6]: Thyroxine is essential for maintaining the body weight. Decrease in thyroxine secretion in hypothyroidism increases the body weight because of fat deposition. The *Samakapha* and *Samameda* which got increased by *Rasadhatwagnimandya* cause *Sthoulya* in hypothyroidism.

Effects on Respiratory System[5]: Thyroid hormones increase oxygen utilization of tissues. In hypothyroidism this got impaired which give rise to respiratory problems like dyspnoea etc.

Properly formed *Rasadhatu* is essential for the *Anulomanagati* of *Swasanamarga*.

From *Samarasa* there will be *Samakapha* formation and this *Samakapha* when get settled in the *Uras* and *Kanda*, the *Anulomanagati* of *Pranavayu* and *Urdhwagati* of *Udanavata* getting disrupted leading to obstruction in inspiration and expiration**.**

Effect on Blood[6]: Thyroxine accelerates erythropoietic activity and increases blood volume. It is one of the important general factors necessary for erythropoiesis. Polycythemia is common in hyperthyroidism and anaemia in hypothyroidism. The proper state of rasa is essential to produce *Raktadhatu.* In hypothyroidism, due to *Rasadhatvagnimandhya, Samarasa* increases and *Rakthadhatu* is not properly formed which leads to *Rakthaksayajanya Vikara*.

Effect on Gastrointestinal Tract[5]

- Thyroid hormone enhances the motility of Gastrointestinal Tract.
- Therefore, hyper defecation is a feature of hyperthyroidism and constipation is a feature of hypothyroidism.

Due to improper *Pachana* of *Ahara*, *Samarasa* and *Malaroopakapha* get formed and this *Aamatva* causes *Sanga* or *Srotorodha* to produce *Malabandha.*

Effect on Cardiovascular System[7]: Thyroxine acts directly on heart and increases the heart rate, force of contraction of the heart and vasodilatation by increasing the metabolic activities. In hypothyroidism, the decrease in thyroid hormones causes deceased heart rate, hypotension etc. Here *Rasadhatu* is vitiated, so *Rasavahasrotas* is affected. Since *Hrdaya* is the *Moola* of *Rasavahasrotas,* it affects *Hrdaya* and produces impairment to its functions**.**

Effect on Skeletal Muscle[5]: Thyroid hormone signalling is required for skeletal muscle development, contractile function and muscle regeneration.

Therefore, hypothyroidism is associated with muscle cramp and weakness

Properly formed *Mamsadhatu* occurs only from a properly formed *Rasadhatu.*

In hypothyroidism due to the *Rasadhatvagnimandhya, Mamsadhatu* is not properly formed or function giving rise to above symptoms**.**

Action on Sleep[6]: Normal thyroxine level is necessary to maintain normal sleep pattern. Hyposecretion of thyroxine causes somnolence

Due to *Rasadhatvagnimandhya* there will be *Samakapha*. Since *Kapha* is having *Asrasrayibandha* with *Medas,* there will be increased *Dusitamedas* formation this *Medodusti* causes *Kshina*, *Alasya* and *Atinidra***.**

Effect on Reproductive System[5]: In both males and females, thyroid hormones play an important role in the regulation of reproductive functions. In women, they cause follicular maturation and ovulation. Hypothyroidism results in irregularities in menstrual cycle, such as menorrhagia and in males the process of spermatogenesis is affected.

In *Rasavahasrotodustilakshna* itself *Klaibya* is a symptom. *Samarasa* formation certainly affects the deep seated *dhatu* level, causing its improper nourishment and thus affects the fertility.

Effect on Kidney[5]: Thyroid hormones increase kidney size and promote growth of renal tubular epitheli-

al cells. They increase renal blood flow and GFR. Tubular reabsorption of electrolytes, glucose and water is also increased by thyroid hormones.

"*Medovahanam Srotasaam Vrikkou Mulam Vapavahanam Cha*". Since *Medodusti* occurs here and the root of *Medovahasrotas* is *Vrikka*, the function of *Vrikka* may be affecting here.

Effects on Nervous System[5]: Thyroid hormones are essential for the development of the central Nervous System, by facilitating the process of differentiation and maturation of brain cells. In hypothyroidism, symptoms affecting the brain such as difficulty concentrating, Short-term and long-term memory problems, lack of focus, confusion, difficulty in thinking etc. Properly formed *Rasadhatu* is essential for the proper formation of *Majjadhatu.* In hypothyroidism, due to *Rasadhatvagnimandhya* the *Poshana* and *Pravartana* of *Majjadhatu* got affected which leads to the above like symptoms in hypothyroidism.

Effect on Other Endocrine Glands[6]: Because of its metabolic effects, thyroxine increases the demand for secretion by other endocrine glands. Since the primarily *Rasadhatu* is affected and *Rasadhatvagni Mandhya* occurs it produces many *Vikara* throughout the body.

In summary, thyroid hormones have widespread effects on metabolism, growth and development and control of many systemic functions and *Rasadhatvagni* has an equivalent effect of it. Decrease in the thyroid hormone disrupts body's metabolism and can leads to hypothyroidism. The metabolic effect of thyroid hormone can be seen on almost all the cells of body. *Jatharagni* digests these substances into the guts and with the assistance of *Samanvayu*it helps the absorption of these substances. *Bhutagni* converts these heterogeneous substances into homogeneous substances so that it can be utilized at the cellular level. *Dhatwagni* depends on *Jathargni* and *Bhutagni* for its function of metabolizing of these substances at the cellular level. Here due to the *Nidana, Jatharagni and Bhutagni Mandhya* occurs which contributes to the *Dhatwagnimandhya* primarily the *Rasdhatvagnimandhya* which later affects the *Uttarothara Dhatu Poshana* and arriving at many symptoms on each *Dhatu* level. As the predominant pathological factors in this condition are *Agnimandhya*, *Rasavaha Srotodusti, Amadosha*, *Kaphavatakopa* and *Srotorodha*, drugs acting on *Agni,* having *Dipana, Pachana, Lekhana, Anulomana, Srotosodhaka, Kaphasamaka* properties along with Dietary rules, Proper life style*, Yoga* and *Pranayama* methods are to be adopted for its management.

CONCLUSION

Hypothyroidism is a disease condition which occurs due to the current fast, sedentary and stressful lifestyle which can bring *Dusti* to the *Rasadhatu*. Due to *Samarasa* formation and *Malaroopakaphavridhi*, further *Dhatuposhana* is affected which leads to a set of symptoms which shows its affliction in almost all systems of the body. The *Samprapti* based explanations given above shows the resemblance of *Rasadhatvagni* with the thyroid hormones. *Rasadhatvagni*, as the thyroid hormones is responsible for the physiological functions of the body and due to this resemblance hypothyroidism may be said as a *Rasadhatvagnimandhya Vikara.*

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