

CHRONIC PHYSICAL DISEASE: PHYSIOLOGY OF THYROID HORMONES WITH AYURVEDIC INTERPRETATION AND PSYCHOLOGICAL IMPACT ON HUMAN BODY: REVIEW BASED STUDY

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ABSTRACT

The thyroid gland is a very vital part of the human body. The thyroid gland is one of the larger glands in the human endocrine system and is invaluable for the proper functioning of the body. The thyroid gland controls the body's metabolism, use and generation of energy and sensitivity to other hormones. The two most common disorders associated with the thyroid are hypothyroidism and hyperthyroidism. An under active thyroid condition is termed 'hypothyroidism' and an overactive thyroid is called 'hyperthyroidism'. Recent studies has shown that the prevalence of thyroid disorders is higher in females as compared to males (24.7% vs 18.2%) (Marwaha, et al, 2012; Mohan, 2012). Thyroid dysfunction has shown a rising trend with age in both the sexes. Millions of Indians suffer from fatigue, weight gain, depression, and cognitive impairment. Many believe that they have no choice but to accept and live with these seemingly "age-related" declines in psychological well-being. At the same time hypothyroidism has been increasingly linked to symptoms of fatigue, lack of energy and general malaise even when the blood values of thyroid hormone are seemingly within the normal range. More and more health care providers are now paying more attention in an attempt to understand what is referred to as sub clinical hypothyroidism.

KEYWORDS: *Thyroid, Hypothyroidism, Psychological stress*

Modern living has brought with it not only innumerable means of comfort but also a plethora of demands that tax the human body and mind. This has resulted in the upcoming of wide range of problems, viz., physiological and psychological which vary in its degree and may extend to psychosomatic illnesses. Variables for psychosomatic disorders under consideration include stress, and other psychological factors such as anxiety, depression, personality pattern, etc. Stress has long been suspected to play a role in the etiology of many diseases. Numerous studies (Cohen, 2007) have shown that stress can be immunosuppressive and hence may be detrimental to health.

It is seen that some systems of the body are more vulnerable to stress than others, e.g., hypothalamic-pituitary axis, endocrine autonomic nervous system, adrenal medulla, etc! Studies related to the effect of stress on the endocrinological system are many (Miller, 2002). In recent times there has been an alarming rise in the rate of endocrinological disorder all over the world, especially thyroid disorders and diabetes mellitus. India is currently experiencing a rapid epidemiological transition from communicable to non-communicable diseases,

like thyroid, diabetes, hypertension, etc. An estimated 110 million people in India suffer from endocrine and metabolic disorders. Out of these about 40 million Indians suffer from thyroid disorders of which 60% are women (Express Pharma, Abbott & Indian Thyroid Society, February, 2012). Women are four times more prone to thyroid disorders than men

1. PHYSIOLOGY OF THYROID HORMONES

The principal hormones secreted by thyroid gland are T3 (Triiodothyronine) and T4 (Thyroxine). Thyroid hormones play a vital role in cell differentiation during development and maintain metabolic homeostasis in adults. The secretion of T3 and T4 are mainly controlled by Thyroid Stimulating Hormone. Thyrotropin releasing hormone (TRH) stimulates the secretion of T3 and T4. The hypothalamic secretion TSH and pituitary secretion of TRH are under negative feedback control of free T4 and free T3.

The initial step in thyroid hormone synthesis is uptake of iodide. Then iodide trapping occurs by which iodide is actively transferred into thyroid cell, where it is "oxidised" to iodine. It then binds with tyrosine to produce monoiodotyrosine (MIT) and diiodotyrosine (DIT). Coupling of MIT with DIT forms T3 whereas coupling of two DIT forms T4. Until secretion thyroid hormones T3 and T4 are in bound form with thyroglobulin. Thyroid peroxidase enzyme catalyzes oxidation, iodination and coupling reactions.

Once the thyroid hormones are secreted into the blood, most of T3 and T4 binds with plasma proteins namely, thyroxine – binding globulin and thyroxine – binding prealbumin and albumin. T4 mainly binds with thyroxine – binding globulin whereas T3 binds mainly with albumin. The plasma binding proteins delays hormonal clearance, increases the circulating pool and helps in regulating hormonal delivery to selected tissue sites. The rest of the thyroid hormones are transported in unbound form as free T3 and free T4. In circulation bound forms are in equilibrium with free forms.

1.1 HYPOTHYROIDISM

Hypothyroidism is caused by reduced secretion of thyroid hormones. It leads to cretinism in children and myxedema in adults. Hypothyroidism can be either primary or secondary. There is intrinsic defect in thyroid gland in primary hypothyroidism whereas it is secondary to hypothalamic or pituitary defect in secondary hypothyroidism. The most common cause of hypothyroidism is low iodine content in the diet. In countries with adequate iodine in the diet the most common cause is autoimmune Hashimoto's thyroiditis. The other causes include certain drugs, previous thyroid surgery, and previous treatment with radioactive iodine, injury to hypothalamus or anterior pituitary gland.

THE SYMPTOMS OF HYPOTHYROIDISM INCLUDES:

Tiredness Weakness Cold intolerance Constipation Dry coarse skin Poor memory and difficulty in concentrating Loss of hair Weight gain Breathlessness Hoarseness of voice Paresthesia Reduced hearing Menorrhagia

Signs: Puffiness of face, hands and feet Bradycardia Cool peripheral extremities Peripheral edema Diffuse alopecia, Delayed tendon reflex relaxation Carpal tunnel syndrome Serous cavity effusions.

1.2 HYPERTHYROIDISM

Hyperthyroidism is a condition resulting from elevated free thyroid hormone level on the body tissues. The major cause includes Graves Disease, Toxic Multi nodular Goitre, and Solitary thyroid nodule.

Symptoms: Intolerance to heat Sweating Hyperactivity, Irritability Dysphonia Palpitation Fatigue, Weakness Weight loss in spite of increased appetite Oligomenorrhoea Loss of libido Polyuria Diarrhoea

Signs: Tremors Warm moist skin Tachycardia Atrial fibrillation in elderly Goitre Proximal Myopathy Muscle weakness.

Apathetic thyrotoxicosis is a condition seen in elderly in whom the features of thyrotoxicosis are subtle or masked, the patients present mainly with weight loss and fatigability.

2. STRESS AND THYROID

Stress is known to be a significant contributor to thyroid dysfunction. Whenever stress is experienced, adrenal glands produce cortisol. This is an evolutionary protective mechanism that originally developed as a response to physical threats. It creates the “fight or flight” response and once the physical threat is gone, cortisol levels go back to their normal levels. Long term effects of stress and subsequent continuous high levels of cortisol cause what is called; “Thyroid Resistance”. “Every cell in the body has receptors for both thyroid hormone and cortisol. Cortisol acts synergistically with thyroid hormone at the epigenetic level. Normal levels of cortisol (neither too much nor too little) need to be present bound to its receptors for optimal function of not only the thyroid gland itself but for every tissue in the body. Too much cortisol causes the tissues to no longer respond to the thyroid hormone signal. This is known as thyroid resistance, meaning that thyroid hormone levels can be normal, but tissues fail to respond as efficiently to the thyroid signal. It can cause TSH levels to be elevated while T4 and T3 are within the normal range.” -Gerson’s Institute of Ayurvedic Medicine

Brown (2011) found that individuals with depression, anxiety often have abnormal levels of thyroid hormone. Treating the problem, can lead to improvements in mood, memory and cognition. However, personality factors, individual’s perception of life events, and other related factors were not addressed to in this study.

Though some researchers have been successful in establishing an association regarding the part played by psychological variables in predisposing a particular physiological ailments, e.g., researches related to coronary heart disease, anxiety (Dwyer, 2001; Rosch, 2004; Hintzen, 2003), findings are yet in conclusive particularly with regard to endocrinological disorders like thyroid dysfunction and diabetes mellitus.

Studies related to this area is very important as it would help us to understand the probable causes behind a person in developing thyroid , dysfunction or diabetes mellitus, and in turn would assist in planning long term management, strategies and preventive measures for such individuals. With such a background, in the present study, emphasis is given to incorporate psychological as well as psychophysiological measures. The present study also focuses on the psychological factors (anxiety, stressful life events, problems in adjustment, locus of control, personality factors, etc.) as well as physiological factors (arousal, skin conductance) that could be the source of stress in some individuals and therefore it emphasizes the need to study an individual perception as determined by various above mentioned psychological variables in causing such stress

3. AYURVEDIC INTERPRETATION OF THYROID GLAND

Ayurveda, the “science of life,” or longevity, is the holistic alternative science of medicine. It is believed to be the oldest healing science in existence, forming the foundation of all others. Originally four main books of Vedic spirituality existed including topics like included health, astrology, spiritual business, government, military, poetry, and ethical living; these are known as the Vedas: Rig, Yajur, Sama and Atharva. Eventually, Ayurveda was organized into its own compact system of health and considered under a branch of Atharva Veda. This Upaveda/branch dealt with the healing aspects of spirituality; although, it did not directly treat spiritual disorders.

Human life has been considered as a valuable opportunity to achieve the prime goals of life viz. Dharma, Artha, Kama and Moksha. To achieve this, one needs a Healthy and Calm life. As stated, Whole Ancient culture tried to achieve all four prime goals of life, so that they had a smooth, sound, safe, assured steady and healthy life style. On the other hand, today mankind is trying to gain good financial status to fulfill all the Physical Desires. As human has entered in 21st century with modernization in each and every perspective of life, he has also paid for it by leaving in several stressful somatic and psychological conditions. The response to the psychological conditions varies person to person because each has different psychic and physical constitution. However, these stresses play certain role in the development, progression, prognosis as well as management of the diseases. This stressful life-style affects one’s mind and homeostasis of body by several psychosomatic mechanisms and causes many psychosomatic disorders. Therefore today’s Metaphysical Society is facing unsteady, weekend, hard & everyday changing lifestyle generated disorders. The miserable gift of

stressful, hectic lifestyle, diet habits, an environmental changes that, man has become victim of many diseases. One such potent gift is Hypothyroidism disorder

Even though there are no direct references in Ayurvedic classical texts in terms of hyper or hypo production of the hormone by the thyroid gland (Avatu Granthi in Sanscrit), but there is a disease by the name Galaganda and Gandamaala, characterized by neck swelling that is known to be diseases of Thyroid gland. "The first description of neck swelling was mentioned in Atharva Veda by the name Apachi. Chakra mentioned the disease under 20 sleshma vikaras. 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 .In Nidana Sthana he described Galaganda as two encapsulated small or big swellings in the anterior angle of the neck, which hang like scrotum (36), whereas Charaka mentioned Galaganda as a solitary swelling." The climatic conditions, water supply, dietary conditions, etc., are mentioned as the main etiological factors. Sushruta stated that Himvatprabhava rivers might give rise to the occurrence of Galaganda . "Bhela described that Sleepda and Galaganda are more common in prachya desa (eastern part of India) of the country, and that persons consuming predominantly fish are liable to develop Galgaganda. Harita Samhitakara described the role of dushtambu (contaminated water) and krimi dosha (infection) in the precipitation of Galaganda." "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 Galandana." Today in maintaining region of Himalaya and Himachala Pradesh endemic Goiter is more common. It is due to the less iodine content in water. **(Sushruta, Sushruta Samhita,2010)**

4. CONCLUSION & SUGGESTION

Stress alone will not cause a thyroid disorder, but it can make the condition worse. The impact of stress on the thyroid occurs by slowing your body's metabolism. This is another way that stress and weight gain are linked. When thyroid function slows during stress, triiodothyronine (T3) and thyroxine (T4) hormone levels fall. Also, the conversion of T4 hormone to T3 may not occur, leading to higher level of reverse T3. Insulin resistance and issues balancing blood sugar often occur alongside hypothyroidism. Increased levels of glucocorticoids lower the levels of TSH in the blood. A delicate balance between stress hormones and cortisol must exist for proper thyroid function. If this delicate balance changes, your thyroid symptoms may increase. Suggestion for reducing stress for better psychological wellbeing:

1. A healthy, balanced diet looks different for everyone. In general, plan to eat three well-balanced meals full of fruits, vegetables, and protein each day. Start your morning off with a good breakfast, one low in sugar but high in protein and fiber. Reducing alcohol, caffeine, and sugar in your diet will help with your overall energy levels. Also, think about how you're eating. Make sure to take the time to sit and enjoy a meal, which will help your body digest food better. While this may seem tough to do in your busy lifestyle, your body and thyroid will thank you for it.
2. Adding thyroid-supporting vitamins and minerals to your daily routine. An iodine deficiency may be a cause of hypothyroidism. In addition to iodine, consider adding other essential vitamins and minerals.
3. Getting enough quality sleep at night can be tough with hypothyroidism. Stress makes getting a good night's sleep tough too. But aiming for a good night's rest can have a huge impact on your thyroid health.
4. Taking time to reflect or meditate can help the body relax. In turn, relaxation leads to reduced stress and less impact on your thyroid.
5. Do something relaxing every day for at least 10 minutes. If you don't already have a go-to de-stressor, "try different things until you figure out what gives you peace," Hatipoglu says. You could call a friend, paint, write, read, or spend time outdoors.
6. Look for ways to be mindful. That's the ability to identify your physical and emotional state without judging it. And it can lower your stress. It also eases anxiety and depression in people with medical conditions like hypothyroidism.
7. Yoga, meditation, therapy, and even regular exercise are all ways to be more mindful and zap stress.

8. Tell someone if you're feeling blue. Stress and depression often go hand-in-hand. And hypothyroidism can bring you down, too. But medication, talk therapy, and other strategies are proven to help.

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