

COMPLICATION AND MANAGEMENT OF HYPOTHYROIDISM -A REVIEW

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<p>*For Correspondence: Department of Physiology & Pharmacology, School of Pharmaceutical Sciences, IFTM University, Moradabad-244 102 (U.P.), India</p>	<p>ABSTRACT Endocrine disorders are common among Indian population out of which thyroid disorders represents an important subset of these endocrine disorders. The prevalence of these thyroid disorders varies widely according to geographical distribution, diet and nutrition and patient population. The occurrence of hypothyroidism in India is 11%, compared with only 2% in the UK and 4.6% in the USA. In countries with enough iodine in the diet, the most common cause of hypothyroidism is the autoimmune condition Hashimoto's thyroiditis. Less common causes include the following: previous treatment with radioactive iodine, injury to the hypothalamus or the anterior pituitary gland, certain medications or previous thyroid surgery. Environmental and nutritional factors are often implicated in the occurrence of most thyroid disorders that occur in the most part of the world. This is a description review that seeks to, prevalence, complications, diagnosed, management and also how to tackle / overcome the symptoms of thyroid disorders.</p> <p>KEY WORDS: Hypothyroidism, hypothalamus, anterior pituitary, complication and nutritional factor etc.</p>
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INTRODUCTION

Endocrine disorders are common among Indian population out of which thyroid disorders represents an important subset of these endocrine disorders (Vanderpump et al., 1995). The burden of thyroid disorders in the general population is enormous. The prevalence of these thyroid disorders varies widely according to geographical distribution, diet and nutrition and patient population. According to the literature, autopsy rates ranging from 0.03% to over 2% have been reported (Louise et al., 2006). Mortensen et al. reported a 2.8% prevalence rate and also account 4% of patients with metastatic neoplasm with secondary tumours to the thyroid gland and on 1000 consecutive patients of thyroid carcinoma in routine autopsies (Mortensen et al., 1956). Hypothyroidism is one of the most common endocrine disorders, with a greater burden of disease in women and the elderly (Canariset et al., 2000). A 20 year follow up survey in the United Kingdom found the annual incidence of primary hypothyroidism to be 3.5 per 1000 in women¹ and 0.6 per 1000 in men (Vanderpump, 1995).² A cross sectional Australian survey found the prevalence of overt hypothyroidism to be 5.4 per 1000 (O'Leary et al., 2006). Almost one-third of the world's population lives in areas of iodine deficiency (Zimmerman et al., 2009). In areas where the daily iodine intake is <50 µg, goitre is usually endemic, and when the daily intake falls <25 µg, congenital hypothyroidism is seen. The prevalence of goitre in areas of severe iodine deficiency can be as high as 80%. Populations

at particular risk tend to be remote and live in mountainous areas in South-East Asia, Latin America and Central Africa. Iodization programmes are of proven value in reducing goitre size and in preventing goitre development and cretinism in children (Vanderpump et al., 2005).

Thyroid Gland

Thyroid is a small butterfly-shaped gland, located in neck, wrapped around the windpipe. It is situated in the neck in front of the larynx and trachea at the level of the 5th, 6th and 7th cervical and 1st thoracic vertebrae (Allison et al., 2011).

The thyroid gland covers the windpipe from three sides. Two hormones of the thyroid gland, T3 (thyroxine) and T4 (triiodothyronine), help the body to produce and regulate the hormones adrenaline (also called epinephrine) and dopamine. Hormones are chemical substances that help control certain cells and organs. Adrenaline and dopamine are active in many physical and emotional responses, including fear, excitement, and pleasure. Other hormones from this gland also help regulate metabolism, which is the process by which calories and oxygen are converted into energy. Without a functioning thyroid, the body would not be able to break down proteins and it would not be able to process carbohydrates and vitamins. For this reason, problems with this gland can lead to uncontrollable weight gain. For many people, these irregularities can be controlled through medications, as well as a modification of their diet. However, there is one other controlling factor. The gland cannot produce hormones on its own. It needs the assistance of the pituitary gland, which creates thyroid stimulating hormone (TSH). As a result, a nonfunctional pituitary gland will eventually lead to thyroid-gland-related issues. TSH will either trigger the production of thyroxine or triiodothyronine. If TSH is not present at the right levels, too much or too little of either hormone will be made (<http://www.healthline.com/human-body-maps/thyroid-gland>).

COMMON CAUSES OF THE DISEASE:

1. Autoimmune Disease

The immune system normally protects the body against bacterial and viral invaders. In autoimmune diseases (auto means self), the immune system Autoimmune thyroiditis mistakenly attacks a normal part of the body. In autoimmune hypothyroidism the immune system accidentally attacks cells in the thyroid gland, interfering with their ability to make thyroid hormone. When enough thyroid cells have been destroyed, too few are left to meet the body's need for thyroid hormone. Autoimmune thyroid disease is more common in women than men. It can start at any age, but becomes more common as people get older. In women, it often begins during pregnancy, after delivery, or around menopause. It can begin suddenly, but in most patients it develops slowly over years. The most common forms are Hashimoto's thyroiditis and atrophic thyroiditis. If some part of the thyroid gland is removed, the remaining part will work well enough to keep thyroid hormone level in blood normal throughout, the person makes enough thyroid hormone to keep blood levels normal at first, but later become UNABLE to meet the body's need for hormone (Loeber et al., 1999).

2. Radiotherapy

Some people with Graves's disease, nodular goitre, or thyroid cancer are given radioactive iodine (I^{131}) to destroy their thyroid gland purposely. Patients with Hodgkin's disease, lymphoma, or cancers of the head or neck are treated with radiation. All these patients can lose part or all of their thyroid function (American Thyroid Association, 2008).

3. Congenital Hypothyroidism

A few babies are born without a thyroid or with a partly formed thyroid. A few babies have part or their entire thyroid in the wrong place (ectopic thyroid). In some babies, the thyroid cells or their enzymes do not work right. Babies with any of these problems may be hypothyroid from birth in some, the thyroid may make enough hormones for a while and then may no longer be able to keep

up with the need, so the person becomes hypothyroid as an older child or even as an adult (Salvatore et al., 1980).

4. Thyroiditis

Thyroiditis is an inflammation of the thyroid gland, usually caused by an autoimmune attack (in postpartum thyroiditis or silent thyroiditis) or by a viral infection. Thyroiditis can make the thyroid release its whole supplies of stored thyroid hormone into the blood at once, causing brief HYPERTHYROIDISM (an overactive thyroid); once the entire stored hormone has been released, the thyroid becomes underactive. Almost all patients with viral thyroiditis recover their thyroid function, but about one-fourth of patients with autoimmune thyroiditis have permanent hypothyroidism (American Thyroid Association, 2008).

5. Medicines

Medicines like amiodarone, lithium, interferon alpha, and interleukin-2 can interfere with the thyroid glands ability to make thyroid hormone. These drugs are most likely to trigger hypothyroidism in patients who have a genetic tendency to autoimmune thyroid disease. It's also possible that treatment with thalidomide for multiple myeloma can cause hypothyroidism (American Thyroid Association, 2008).

6. Iodine Content

Thyroid gland must have iodine to make thyroid hormone. Iodine comes into the body from foods, mainly dairy products, chicken, beef, pork, fish, and iodized salt. The iodine then travels through the blood to the thyroid. Keeping thyroid hormone production in balance requires the right amount of iodine. People who live in undeveloped parts of the world may not get enough iodine in their diet. Worldwide, iodine deficiency is the most common cause of hypothyroidism (Selinus et al., 2005).

7. Damage to the Pituitary Gland and Some disorders that infiltrate the thyroid

The pituitary gland controls the thyroid how much hormone to make. If the pituitary is damaged by a tumor, radiation, or surgery, it may no longer be able to give the thyroid the right instructions, and the thyroid may stop making enough hormones. In a few people, diseases deposit abnormal substances in the thyroid. For example, amyloidosis can deposit amyloid protein, sarcoidosis can deposit granulomas, and hemochromatosis can deposit iron. These deposits can prevent the thyroid from working right (American Thyroid Association, 2008)). Hypothyroidism is often classified by association with the indicated organ dysfunction (Simon, 2006).

Table 1: Classification of hypothyroidism.

Type	Origin	Description
Primary	Thyroid gland	The most common forms include Hashimoto's thyroiditis (an autoimmune disease) and radioiodine therapy for hyperthyroidism
Secondary	Pituitary gland	Occurs if the pituitary gland does not create enough thyroid-stimulating hormone (TSH) to induce the thyroid gland to produce enough thyroxine and triiodothyronine. Although not every case of secondary hypothyroidism has a clear-cut cause, it is usually caused by damage to the pituitary gland, as by a tumor, radiation, or surgery. Secondary hypothyroidism accounts for less than 5% or 10% of hypothyroidism cases
Tertiary	Hypothalamus	Results when the hypothalamus fails to produce sufficient thyrotropin-releasing hormone (TRH). TRH prompts the pituitary gland to produce thyroid-stimulating hormone (TSH). Hence may also be termed hypothalamic-pituitary-axis hypothyroidism. It accounts for less than 5% of hypothyroidism cases

EPIDEMIOLOGY

Hypothyroidism is a relatively common disorder. The prevalence of hypothyroidism increases with age, and the disorder is nearly 10 times more common in females than in males. Subclinical hypothyroidism is more prevalent and can be seen in as many as 15% of older women. In the United States National Health and Nutrition Examination Survey (NHANES III), prevalence of overt hypothyroidism was found to be 0.3% prevalence of subclinical hypothyroidism was found to be 4.3% (Fatourechi, 2009). Estimates of subclinical hypothyroidism ranges between 3-8%, increasing with age (Agabegi et al., 2008). Iodine deficiency is the most common cause of hypothyroidism worldwide. Congenital hypothyroidism is one of the most preventable causes of mental retardation. It occurs approximately in 1:3000, 1:4000 newborns (Burness and Shaw, 2008). The prevalence of hypothyroidism in the general population ranges from 3.8%–4.6% (Vanderpump et al., 1995; Hollowell et al., 2002; Leese et al., 2008 and Jacob et al., 2015). The Wickham survey showed an annual incidence of hypothyroidism of 4.1 per 1000 in women and 0.6 per 1000 in men Furthermore, a more recent study from the UK suggests that the incidence of hypothyroidism is rising (Vanderpump et al., 1995), although there appears to be geographical variation. For example, epidemiological studies suggest Denmark has nine times fewer new cases of hypothyroidism than the UK (<http://www.press.endocrine.org>). In the UK, over 23 million prescriptions for Levothyroxine were written in 2010, making it the third most prescribed medication after simvastatin and aspirin (Tunbridge et al., 1977). In developing countries like India the cases of hypothyroidism are more than developed countries, but due to less awareness and the symptoms that are not so specific, the disease remain undiagnosed.

ETIOLOGY

Environmental iodine deficiency is the most common cause of hypothyroidism on a worldwide basis (Andersson et al., 2007). In areas of iodine sufficiency, such as the United States, the most common cause of hypothyroidism is chronic autoimmune thyroiditis (Hashimoto's thyroiditis). Autoimmune thyroid diseases (AITDs) have been estimated to be 5-10 times more common in women than in men. The ratio varies from series to series and is dependent on the definition of disease, whether it is clinically evident or not. In the Whickham survey (Vanderpump et al., 1995), for example, 5% of women and 1% of men had both positive antibody tests and a serum TSH value >6. This form of AITD (i.e., Hashimoto's thyroiditis, chronic autoimmune thyroiditis) increases in frequency with age, and is more common in people with other autoimmune diseases and their families (Nerup et al., 1974).

SYMPTOMS: (Laurberg, 2010, Velázquez et al., 1997 and Jabbar et al., 2008)

Hypothyroidism can be associated with the following symptoms,

a. Early

- Cold intolerance, increased sensitivity to cold
- Constipation
- Weight gain and water retention
- Bradycardia (low heart rate – fewer than sixty beats per minute)
- Fatigue
- Decreased sweating
- Muscle cramps and joint pain
- Dry, itchy skin
- Thin, brittle fingernails
- Rapid thoughts
- Depression

- Poor muscle tone (muscle hypotonia)
- Female infertility, any kind of problems with menstrual cycles
- Hyperprolactinemia and galactorrhea
- Elevated serum cholesterol

b. Late

- Goiter swelling in the front of the neck, caused by enlargement of the thyroid; goiter is most likely to be part of Hashimoto's thyroiditis
- Slow speech and a hoarse, breaking voice – deepening of the voice
- Dry puffy skin, especially on the face
- Thinning of the outer third of the eyebrows (sign of Hertoghe)
- Abnormal menstrual cycles
- Low basal body temperature

c. Uncommon

- Impaired cognitive function (brain fog) and inattentiveness
- A slow heart rate with ECG changes including low voltage signals
- Diminished cardiac output and decreased contractility
- Sluggish reflexes
- Hair loss
- Difficulty in swallowing
- Shortness of breath with a shallow and slow respiratory pattern
- Increased need for sleep
- Irritability and mood instability
- Yellowing of the skin due to conversion of beta-carotene to vitamin
- Impaired renal function with decreased glomerular filtration rate
- Acute psychosis (myxedema) (a rare presentation of hypothyroidism)
- Puffy face, hands and feet (late, less common symptoms)
- Gynecomastia
- Deafness
- Yellow or orange skin, caused by a build-up of the pigment carotene
- Drier, coarser, more brittle hair
- More hair loss (patients do not go bald but their hair can look thin)
- Loss of appetite
- Decreased sense of taste and smell (Anosmia)

DIAGNOSIS

Diagnosis of thyroid dysfunction can be difficult for various reasons. Although some thyroid disorders have clinical manifestations that are distinctive (e.g., ophthalmopathy associated with Graves' disease) many clinical features of hypothyroidism are subtle, nonspecific, and may be difficult to recognize. Patients with subclinical hypothyroidism (mild thyroid failure) may be asymptomatic. In addition, as the natural history of a thyroid disorder evolves, there are changes in symptoms associated with the underlying thyroid dysfunction. Over the last decade, improvements have been made in laboratory tests to assess thyroid function. Nonetheless, the large number and variety of available tests and their interpretation in various clinical circumstances can be confusing. Once thyroid dysfunction is diagnosed, its treatment and management must be individualized based on many factors, including

the etiology of the dysfunction, the attributes of the patient, the benefits and risks of treatment, and the available medication from managed care formularies (Singer et al., 1995).

TESTING

TSH (thyroid-stimulating hormone) is the most important and sensitive test for hypothyroidism. TSH is a simple blood test that measures how much T4 the thyroid gland synthesised. An abnormally high TSH means hypothyroidism: The thyroid gland is being asked to make more T4 because there isn't enough T4 in the blood. The only validated test to diagnose primary hypothyroidism, is to measure Thyroid stimulating hormone (TSH) and free thyroxine (T4). However, these levels can be affected by non-thyroidal illnesses. High levels of TSH indicate that the thyroid is not producing sufficient levels of thyroid hormone (mainly as thyroxine (T₄) and smaller amounts of triiodothyronine (T₃)). However, measuring just TSH fails to diagnose secondary and tertiary hypothyroidism, thus leading to the following suggested blood testing if the TSH is normal and hypothyroidism is still suspected

- Free levothyroxine (FT₄)
- Free triiodothyronine (FT₃)
- Total T₃
- Total T₄

Because many signs and symptoms of hypothyroidism are nonspecific and patients with subclinical hypothyroidism (mild thyroid failure) may be asymptomatic, office-based testing of suspected patients by primary care physicians is important to ensure an early and accurate diagnosis. A comprehensive medical diagnosis confirmed by thyroid function tests prior to treatment is important to avoid the inappropriate use of thyroid hormone replacement therapy in patients who are not clinically hypothyroid. Measurement of the serum thyrotropin (thyroid stimulating hormone, TSH) concentration beginning at 35 years of age and every 5 years thereafter 7 more frequent testing may be appropriate for individuals. At higher risk of developing thyroid dysfunction. The indication for TSH testing is particularly compelling in women, but it can also be justified in men over 60 years of age as a relatively cost-effective measure in the context of a periodic health examination. TSH testing may be particularly useful in elderly patients, since thyroid disease symptoms may mimic characteristics associated with aging (e.g. memory loss, fatigue, depression, and alopecia).

TEST INTERPRETATION

An increased TSH level (>4.12 mIU/L) suggests a diagnosis of primary hypothyroidism; this diagnosis confirmed if the patient has a low free thyroxine (FT₄) level, Because TSH is a more sensitive test than FT₄, patients with subclinical hypothyroidism (mild thyroid failure) will have a normal FT₄ with an elevated TSH level (Surks et al., 1990 and Helfand and Redfern, 1998). In the presence of an increased TSH with a normal FT₄, a thyroid peroxidase antibody (TPO ab) test is useful for establishing thyroid autoimmunity as the cause of subclinical hypothyroidism (mild thyroid failure). A normal TSH level (0.45 mIU/L to 4.12 mIU/L) generally excludes the diagnosis of primary hypothyroidism, although there may be circumstances when patients with chronic autoimmune thyroiditis have normal TSH levels. A normal TSH level in a patient with low FT₄ suggests secondary hypothyroidism or a hypothalamic-pituitary disorder.

Table 2: Level of hypothyroidism.

State	Normal	At risk	Mild	Severe
TSH Level (mIU/L)	0.4	2.5	<4.0	10.0

Diagnosis of hypothyroidism in severely ill patients is complex, and the fact that most thyroid function. Tests (including the TSH test) often give misleading results in patients with other acute

medical conditions should be considered; these patients probably should be evaluated by an endocrinologist. Level of hypothyroidism and associated risk. (Woolever and Beutler, 2007).

TREATMENT

A. PHARMACOLOGICAL

Allopathic Treatment

By the end of the 19th century, myxedema had been attributed to diminished thyroid function and a cretinism-like condition had been observed following thyroidectomy in animals and humans (Lindholm and Laurberg, 2011). Moreover, xenotransplantation of animal thyroid gland had been shown to improve symptoms in women suffering from myxedema temporarily. In 1891, Murray described the first regime of thyroid hormone replacement, subcutaneously injecting extract of sheep thyroid into a patient with hypothyroidism. It was soon shown that oral administration of thyroid extract was as effective. In 1914, Kendall purified thyroxine crystals, which became commercially available. Harrington identified the structure of thyroxine in 1926 and synthetic thyroxine was available for clinical use by the 1930s (Murray, 1891). However, it took many more years before thyroxine became preferable to desiccated thyroid extract as the treatment of choice for hypothyroidism (Fox, 1661). In 1952, Gross and Pitts-River identified the more potent liothyronine.

a. Levothyroxine

Levothyroxine is the treatment of choice for hypothyroidism. It has seven days' half-life, allowing daily dosing. A randomized controlled trial has shown that, in patients with no significant comorbidities, initiation of levothyroxine at a full dose based on body weight (1.6 µg/kg/day) is safe, effective, and requires fewer resources than using a more traditional approach of starting with a small dose and gradually titrating upward. The exceptions to this are the elderly and patients with known ischemic heart disease.

Timing of Levothyroxine

Conventionally, hypothyroid patients are advised to take levothyroxine on an empty stomach half an hour before breakfast to prevent impairment of absorption by food (Gross and Pitt-Rivers, 1953). The conflicting findings of different studies may reflect heterogeneity in the conditions of patients studied as well as in eating habits in relation to bedtime in the different study populations.

Monitoring Thyroid Function during Levothyroxine Replacement

When initiating levothyroxine therapy, serum TSH should be measured to monitor for adequate replacement. TSH can take up to 4 months to normalize, even when starting on a full dose replacement regimen, due to thyrotroph hyperplasia. It is recommended that the TSH is measured 6–8 weeks after initiation of, or a change in levothyroxine dose. Once the patient is on a stable dose of levothyroxine, annual monitoring of TSH is recommended, although a retrospective study suggests that the monitoring interval could be safely increased to 18 months (Roberts and Ladenson, 2004). It is generally recommended to aim for a TSH in the lower half of the normal range, ie, typically <2.5 mIU/L in patients with primary hypothyroidism on levothyroxine replacement.

Drug Interactions with Levothyroxine

Several medications, supplements, and food can interfere with the absorption and action of levothyroxine. Common drugs that can affect levothyroxine absorption include iron, calcium, cholestyramine, and aluminum and levothyroxine must be taken at least 4 hours apart from these drugs. Enzyme inducers, such as phenytoin, carbamazepine, phenobarbital, and rifampicin can increase the clearance of levothyroxine, necessitating an increased dose. Of women starting estrogen hormone replacement treatment, 35% were shown to need an increase in levothyroxine dose, thought to be due to increased thyroxine-binding globuli (Arafah, 2001). Hypothyroidism itself can lead to altered metabolism of medications, such that when rendered euthyroid, patients with

hypothyroidism may need alterations in the dose of their medications. For example, initiation of levothyroxine in a hypothyroid patient may enhance the effect of warfarin, which may need dose adjustment.

b. Triiodothyronine-Levothyroxine Combination Therapy

A significant minority of hypothyroid patients treated with levothyroxine does not feel completely well and have a poorer quality of life. There are several possible causes for impaired wellbeing in these patients. Firstly, a number of them have a TSH outside the normal range, suggesting a suboptimal dosage of levothyroxine. Secondly, given that both hypothyroidism and dysphoria are common diagnoses, there will be a clinical overlap and thus symptoms attributed to hypothyroidism may not improve with treatment. Moreover, patients feeling unwell are more likely to seek medical advice and thus get their thyroid function tested. Thirdly, decreased wellbeing could be due to intrinsic autoimmunity irrespective of the patient's thyroid status (Saravanan and Dayan, 2004). Lastly, serum TSH may not accurately reflect thyroid hormone concentrations in all target tissues. Furthermore, in thyroidectomized rats, tissue euthyroidism could be achieved by infusion of both levothyroxine and triiodothyronine and not by levothyroxine alone. These observations led to the hypothesis that a triiodothyronine-levothyroxine combination is necessary to restore tissue euthyroidism in patients with hypothyroidism.

Several studies have evaluated triiodothyronine-levothyroxine combination therapy in patients with hypothyroidism. An early study from Lithuania showed significant improvement in wellbeing when 50 µg of levothyroxine was replaced with 12.5 µg of triiodothyronine however, several subsequent randomized controlled trials have failed to confirm this effect.

c. Desiccated Pig Thyroid Extract (Armour)

Desiccated pig thyroid extract (Armour thyroid) contains both thyroxine and triiodothyronine in a ratio of about 4:1. This is in contrast with human physiological thyroxine and triiodothyronine ratio of 14:1 (Escobar-Morreale et al., 2005), and therefore the thyroid extract contains a supraphysiological amount of triiodothyronine. There is no clinical trial evidence to show that it is more effective than levothyroxine.

d. Triiodothyronine Therapy

Patient received triiodothyronine or levothyroxine three times a day to achieve a target TSH of 0.5–1.5 mIU/L. After 6 weeks of treatment, triiodothyronine was associated with reduced body weight and an improved lipid profile and had no effect on cardiovascular function, insulin sensitivity, or quality of life scores. Routine use of levothyroxine in subclinical hypothyroidism is controversial. TSH is higher than 10 mIU/L. Subclinical hypothyroidism in pregnant women and women planning to conceive should also be treated with levothyroxine.

Ayurvedic Treatment

Ayurvedic medicines are also used to control the hypothyroidism as the side effects are very less in this system of medicines. Hypothyroidism are notorious, the symptomatic treatment is followed according to the suitability of the individual cases, i.e., sthoulya, sodha etc. Action of drugs acting at various levels:

- At hypothalamo pituitary level: anti stress drugs, medhya rasayana drugs, nasya karma may be beneficial.
- At thyroid gland level: thyroid stimulatory drugs are recommended here.
- At metabolism level: deepana, pachana, ushna, teekshna, sukshma, lekhana drugs which pep-up body metabolism is recommended.
- Immuno-modulatory drugs for autoimmune related hypothyroidism. As the symptoms of hypothyroidism are notorious, the symptomatic treatment is followed according to the suitability

of the. Some of the herbal remedy use to treat hypothyroidism-(<http://www.nativeremedies.com>) (<http://www.livestrong.com>)

- Kanchanara (Guggulu)
- Bladder wrack (Fucus vesiculosus)
- ShilajeetAsphaltum puniabiunum)
- Makandi (Coleus forskohli)
- Siberian ginseng

Homeopathic Treatment

Homoeopathy remedies for hypothyroidism are chosen to offer individual treatment based on the study of patient's underactive thyroid, its extent, cause, genetic pattern, emotional sphere, hormonal misbalance, mental, physical, and so on. Homeopathic system of medicine uses the plants extract, animals and mineral in different proportion according to patient history. The different medicines used are following- (<http://www.nativeremedies.com>)

- Kali-crab
- Sepia
- Natrum-muritium
- Lycopus
- Spigelia
- Sponiatosta
- Calcarea iodatum
- Ferru iodatum

B. NON-PHARMACOLOGICAL

There is no cure for hypothyroidism, and most patients have it for life. There are many patients with viral thyroiditis have their thyroid function return to normal, as do some patients with thyroiditis after pregnancy. Rare patients with Hashimoto's thyroiditis return to normal. Some of the non-pharmacological treatment they also beneficial in hypothyroidism-

1. Exercise

Exercise improves energy level; exercise stimulates thyroid hormone secretion and increases the sensitivity of the tissue to thyroid hormones. Daily exercise for 45 minutes is very beneficial in hypothyroidism.

Yoga can have a very beneficial effect on the thyroid, via increased circulation and stimulation of the thyroid gland, as well as via its stress-reducing actions. Walking is also good.

2. Stress management

Stress also effects the thyroid gland secretions. Stress and the corresponding hormones involved in the stress response (cortisol) can contribute to hypothyroidism. Meditation, yoga shows beneficial effect in the stress management.

3. Diet (<http://www.dailymail.co.uk/femail/article-23103/Which-foods-help-underactive-thyroid>)

(Nutrient to be increased)

Iodine: Iodine is a vital nutrient in the body and essential to thyroid function; thyroid hormones are comprised of iodine. While autoimmune disease is the primary cause of thyroid dysfunction in the United States, iodine deficiency is the main cause worldwide.

Zinc: Zinc, together with Vitamin E and Vitamin A, plays an important role in the manufacturing of thyroid hormones. A zinc deficiency will lead to a lower production of thyroid hormones. Zinc is a cofactor in the conversion of T4 to T3, which is essential for the body's use of thyroid hormones at the cellular level.

Iodine: Iodine is the most essential mineral for the thyroid gland and is or goitre (enlarged thyroid gland). Iodine is very deficient in modern day soils, especially in in-land (non-coastal) areas. Iodine rich food is necessary for the production of T4 hormone. Iodine deficiency can lead to hypothyroidism seafood, sea vegetables (seaweeds) and sea salt. Incorporating sea vegetables into the diet is much easier than many people realize (<http://www.livestrong.com>). Kombu can be added to cooking legumes, to make the legumes more digestible and add valuable nutrients to the meal.

Copper: Copper, along with Zinc and Selenium, is a required cofactor in the conversion of T4 to T3, which is essential for the body's use of thyroid hormones at the cellular level. Levels of Zinc and Copper need to be kept in a delicate balance. Liver, Sesame seeds, Barley, Sunflower seeds are good sources.

Selenium: Selenium is a required cofactor in the conversion of T4 to T3. Selenium levels are very low in most modern-day soil. It has been shown that thyroid disease is highest in areas where the Selenium levels are low in the soil. Therefore, it is vital to supplement with Selenium for adequate levels.

Tyrosine: Tyrosine is an amino acid (protein building block). When combined with iodine in the thyroid gland, the hormones T4 and T3 are manufactured. A deficiency can lead to the hypothyroidism and fatigue. Stress and poor digestion significantly depletes tyrosine levels.

Vitamin A: Vitamin A, together with Zinc is important in the manufacturing of thyroid hormones. All orange and yellow coloured vegetables, as they are a good source of vitamin, Spinac, Organic grass fed cow dairy products, kale.

Iron: Iron is necessary to assist our cells utilization of thyroid hormones. Anemic patients cells struggle to use T3 and your cellular energy levels will suffer.

Vitamin D: Vitamin D deficiency is linked to Hashimoto's, according to one study showing that more than 90% of patients studied were deficient. However, it's unclear whether the low vitamin D levels were the direct cause of Hashimoto's or the result of the disease process itself.

(Nutrient /Food to Avoid)

Avoid all Goitrogen: Goitrogens are substances that combine with iodine in the body, thus making it unavailable for use by the thyroid in synthesizing thyroid hormones. Foods that contain goitrogens include: raw brassica vegetables such as cabbage, cauliflower, mustard, broccoli, brussel sprouts, peaches, spinach, radishes, strawberries, turnips, soy, peanuts, pine nuts, walnuts, flax seeds and millet.

Unsoaked Grains, Nuts and Legumes: All of these foods contain phytic acid which blocks zinc and other mineral absorption. If grains are soaked in water before cooking, it removes or greatly reduces the phytic acid. Non-traditional, unfermented soy products (such as soy protein isolate) are also high in phytic acid.

COMPLICATIONS

Hypothyroidism can lead to a number of health disorders if it is left untreated. Some of the potential problems that may develop are listed here:

- Myxedema coma
- Infertility
- Miscarriage
- Impaired fertility
- Difficulty in conceiving
- Easy miscarriage
- Mental retardation

- Cardiac diseases
- Lead to increased level of LDL
- Psychological problems
- Rise of cardiomyopathy
- Heart failure
- Depression

Myxedema

Myxedema is the medical term for extreme hypothyroidism—when the disorder has progressed for a long time with no treatment. Myxedema is very rare because it's highly unlikely that you wouldn't recognize the symptoms and seek treatment. This form of hypothyroidism is life threatening. Myxedema can eventually slow metabolism to the point where you would fall into a coma. If you experience symptoms of myxedema, such as extreme fatigue or cold intolerance, seek medical treatment immediately. The key to preventing the complications of hypothyroidism is to understand the disorder's symptoms and seek proper medical care. Hypothyroidism is manageable with the right treatment—it doesn't have to interfere with your everyday life (Wall, 2006).

Pregnancy and Fertility

Thyroid hormones have profound effects on reproduction and pregnancy. Thyroid dysfunction is implicated in a broad spectrum of reproductive disorders, ranging from abnormal sexual development to menstrual irregularities and infertility (Bercovici, 2000) (Vaquero et al., 2000). Hypothyroidism is associated with increased production of TRH, which stimulates pituitary to secrete TSH and PRL. Hyperprolactinemia adversely affects fertility potential by impairing GnRH pulsatility and thereby ovarian function (Davis et al., 2007 and Poppe et al., 2007). Hypothyroid women experience decreased fertility, those who do conceive run a higher risk of various obstetric illness. These include abortion, pregnancy-induced hypertension, placental abruption, and post-partum haemorrhage (Mandel, 2008).

Hypothyroidism and Psychological Problems:

Since hypothyroidism usually develops slowly, and the early complaints are frequently minor, vague and diffuse in nature, it is not surprising that the diagnosis is often overlooked. However, the physical changes that accompany the illness are characteristic: dry, rough skin; pale and puffy complexion; loss of hair; change in voice; decreased appetite, etc.

Psychological symptoms are common and well manifested by the time the patient seeks medical advice. Not infrequently, psychological disturbances are the main complaints that bring hypothyroid patients to the psychiatrist first:

- marked slowing of all mental processes
- progressive loss of initiative and interest
- memory difficulties
- thinking is easily muddled
- general intellectual deterioration
- depression with paranoid flavor
- organic psychosis

In severe, untreated cases, dementia may be the ultimate outcome. This underscores the importance of early detection and treatment (Placidi et al., 1998)

Hypothyroidism and heart disease:

Subclinical hypothyroidism (normal serum T4, raised TSH) is usually caused by autoimmune (lymphocytic) thyroiditis, characterized by the presence of antiperoxidase antibodies in the serum,

and may be associated with coronary artery disease. For example, in one postmortem study there was histological evidence of lymphocytic thyroiditis in 20% of men and 50% of women with fatal myocardial infarction and only 10% of men and women who died from other causes (Bastenie et al., 1967). Although hyperlipidemia is common in overt hypothyroidism this may not explain the putative link between subclinical autoimmune thyroid disease and ischemic heart disease. A meta-analysis of the many studies published between 1976 and 1996 on the effect of thyroxine replacement on lipids in subclinical hypothyroidism showed that restoration of serum TSH to normal reduced total cholesterol by only 0.4 mmol/l, and had little effect on high density lipoprotein (HDL) cholesterol (tanis et al., 1996).

Renal Complications

Hypothyroidism frequently lowers the kidney's ability to excrete water. As a result, blood levels of sodium may be unusually low, or serum levels of creatinine may be unusually high. Replacing thyroid hormones can fix these complications. But if extremely low hormone levels persist, recovery from these renal disorders can take longer (Lin et al., 1998 and Nakahama et al., 2001).

Nerve Damage

Hypothyroidism can cause symptoms such as muscle weakness or nerve damage. Those with untreated hypothyroidism may also be more prone to carpal tunnel syndrome (Tonner et al., 1993).

CONCLUSION

Hypothyroidism is not disease but a syndrome can lead to different types of disorders that make the life discomfort or life threatening condition. Though it is not cured, but managed by some pharmacological and non-pharmacological methods. Exercise, yoga and diet play commercial role in management and control of this disease. Environmental and nutritional factors are often implicated in the occurrence of most thyroid disorders that occur in the most part of the world. This is a description review that seeks to, prevalence, complications, diagnosed, management and also how to tackle / overcome the symptoms of thyroid disorders.

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