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# THYROID: AN UPDATED STUDY ON THE DIAGNOSIS AND TREATMENT OF HYPER AND HYPO THYROIDISM

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## ABSTRACT

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. The thyroid's job is to make thyroid hormones, which are secreted into the blood and then carried to every tissue in the body. Thyroid hormone helps the body use energy, stay warm and keep the brain, heart, muscles, and other organs working as they should. The thyroid gland is the first of the body's endocrine glands to develop, on approximately the 24th day or 3-4 weeks of gestation, but at around 10-12 weeks the thyroid begins to function on its own. Thyroid hormones are involved in regulation of vital body function. In general normal development, growth and reproduction cannot occur without them. Thyroid function disorders can generally be grouped into two classes, namely hyperthyroidism and hypothyroidism. The proper treatment of hyper- and hypothyroidism depends on recognition of the signs and symptoms of the disease and determination of the aetiology. Thyroid hormones, the only known iodine-containing compounds with biological activity, have two important functions. In developing animals and human beings, they are crucial determinants of normal development, especially in the central nervous system (CNS). The thyroid is responsible for production and secretion of the thyroxin (T4) and tri iodothyronine (T3) hormones and calcitonin throughout the body. Thyroid hormones is regulated by the hypothalamic-pituitary-thyroid axis. The hypothalamus secretes thyrotropin releasing hormone (TRH) in a tropic fashion that activates the anterior pituitary to secrete thyroid stimulating hormone (TSH). TSH targets the thyroid and elevates thyroid hormone production. When adequate thyroid hormones are produced and secreted, the anterior pituitary stops secreting TSH via a negative feedback Mechanism.

**KEYWORDS:** Thyroid, Hyperthyroid, Hypothyroid, Thyroid in pregnancy, Thyroid treatment.

## INTRODUCTION

One of the fastest growing disorders in modern times is the malfunction of the Thyroid. The statistics show that the Thyroid condition is the most under-diagnosed health problem. There are millions of people suffering from Thyroid problems, but only a few out of those are diagnosed and treated, see positive results using Thyroid medications. Often the Thyroid levels appear normal with lab, yet the individuals struggle with the symptoms of Thyroid problem. The Thyroid is one of several glands in the endocrine system, located in the front of the neck. The glands of the endocrine system control many of the body's functions through chemical substances called hormones. The hormones produced by the Thyroid gland regulate how the body cells use energy and how fast the body's metabolism work. This gland also affects the rate of growth of the hair and bones, the body over weight, temperature and energy level as well as the function of the heart and digestive system.

Thyroid an important gland of the endocrine system looks after the functioning of the human system's metabolism rate, manufacturing of protein and its overall adjustment and sensitivity to other forms of hormone. With the help of a wide variety of hormones produced by it, the thyroid gland ensures an active participation in the mentioned functions. But if the production of its varying hormones exceeds its normal limit or falls below its standard limit; mal functioning of thyroid gland is caused. Generally referred to as hypo and hyper thyroidism; mal functioning of thyroid gland is marked by either abnormal gain or loss of weight, general sense of lethargy, inertia, fall in the rate of pulse and mood swings.

### What is the thyroid?

The thyroid is a 2-inch-long, butterfly-shaped gland weighing less than 1 ounce. Located in the front of the neck below the larynx, or voice box, it has two lobes, one on either side of the windpipe. The thyroid is one of the glands that make up the endocrine system. The glands of the endocrine system produce, store, and release hormones into the bloodstream. The hormones then travel through the body and direct the activity of the body's cells.

**Table No 1: functioning of thyroid gland.**

| System | Effect due to deficiency (hypothyroidism) |
|---|---|
| I. Growth and development | for the first two decades of life, irreversible fetal central nervous system, damage to CNS |
| II. Metabolism | Effect on basal metabolic rate, increased cholesterol and LDL Levels, decreased appetite |
| III. Nervous system | Headache, vertigo or tinnitus, relaxation of deep tendon reflexes, Psychiatric disorders, cognitive deficits, and visual disturbances. Delayed neuro-psychomotor development and growth.(5,31) |
| IV. Cardiovascular system | decreased contractility, pulse rate and stroke volume are diminished, and cardiac output is often decreased to half the normal value |
| V. Gastrointestinal (GI) system | Achlorhydria, pernicious anemia |
| VI. Reproductive system | menstrual irregularities(30,31), anovulation, and infertility (33)(Stradtman, 1993), abnormalities of gonadal function (Joshi et al., 1993), infertility(33) and miscarriage. |
| VII. Musculoskeletal system | delayed relaxation of deep tendon reflexes (Aronow, 1995). arthralgias, joint effusions, and pseudogout |

**What is the thyroid gland?**

The thyroid gland located in the neck produces thyroid hormones which help the body use energy, stay warm and keep the brain, heart, muscles, and other organs working normally Thyroid disorders can range from a slightly enlarged thyroid gland that needs no treatment to life-threatening thyroid cancer. The most common thyroid problems involve the abnormal production of thyroid hormones. Thyroid function disorders can generally be grouped into two classes.

1. ***Hyperthyroidism (thyrotoxicosis):*** Over activity of the thyroid gland leads to high levels of thyroid hormones and the speeding up of the metabolism. The heart rate and blood pressure may increase, heart rhythms may be abnormal, and patients may sweat excessively, feel nervous and anxious, have difficulty sleeping, and lose weight without dieting. Graves' disease (toxic diffuse goiter) is the most common cause of hyperthyroidism.

**Key Symptoms of Hyperthyroidism (An overactive thyroid)**

Nervousness; irritability; increased perspiration; thinning of your skin; fine brittle hair; muscular weakness especially involving the upper arms and thighs; shaky hands; panic disorder; insomnia; racing heart; more frequent bowel movements; weight loss despite a good appetite; lighter flow, less frequent menstrual periods, etc.

**2.** ***Hypothyroidism (myxoedema):*** Under activity of the thyroid gland leads to inadequate production of thyroid hormones and a slowing of metabolism. The facial expressions become dull, the voice is hoarse, speech is slow, the eyelids droop, and the eyes and face become puffy. Patients with hypothyroidism usually need to take thyroid preparations for the rest of their lives.

**Key Symptoms of Hypothyroidism (An underactive thyroid)**

Fatigue; exhaustion feeling run down and sluggish depression, moodiness difficulty concentrating; brain fog; unexplained or excessive weight gain; dry, coarse and/or itchy skin; dry, coarse and/or thinning hair; feeling cold, especially in the extremities; constipation; muscle.

Cramps; increased menstrual flow; more frequent periods; infertility/miscarriage; low blood pressure; frequent infections; bloating/puffiness in hands, feet, eye area, face, etc.

The thyroid is controlled by the pituitary gland, which secretes thyroid-stimulating hormone or thyrotropin (TSH) in response to the blood thyroxine level. The two most important thyroid hormones are thyroxine (T4) and triiodothyronine (T3). These hormones regulate the body's metabolism and affect processes such as growth and other important functions in the body.

| S.No | Symptoms of Hypothyroidism | Symptoms of Hyperthyroidism |
|---|---|---|
| 1. | **Puffiness in hands**  | **Shaking or Severing hands**  |
| 2. | **Weight gain**  | **Weight loss**  |
| 3. | **Skin get dry** | **Skin get thin** |

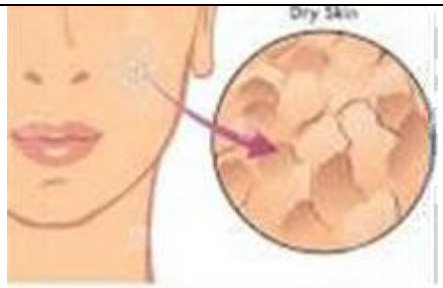
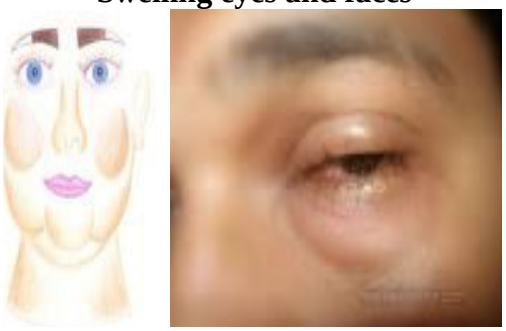
| | | |
|---|---|---|
| |  |  |
| **4.** | **Hair get dry and coarse, thin**<br>  | **Hair get fine and brittle**<br>  |
| **5.** | **Blood pressure low**<br>  | **Panic diseases**<br>  |
| **6.** | **Swelling eyes and faces**<br>  | **Panic diseases**<br>  |

**Figure 1: Shows the summarization of Symptoms of Hypothyroidism and Hyperthyroidism diseases.**

**Table 2: Symptoms of hypothyroidism.**

| **Early symptoms** | **Late symptoms (if left untreated)** |
|---|---|
| • Sensitivity to cold<br>• Constipation<br>• Depression<br>• Fatigue and slowing down<br>• Heavier menstrual periods<br>• Joint and muscle pain<br>• Pale and dry skin<br>• Thin, brittle hair and fingernails<br>• Weakness<br>• Unintentional weight gain | • Decreased sensation of taste and smell<br>• Hoarseness<br>• Puffy face, hands and feet<br>• Slow speech<br>• Thickening of the skin<br>• Thinning of the eyebrows |

**Table 3: Comparative Signs and symptoms of hypo- and hyperthyroidism.**

| **Hypothyroidism** | **Hyperthyroidism** |
|---|---|
| Dry, coarse hair | Hair loss |
| Loss of eyebrow hair | Bulging eyes |
| Puffy face | Sweating |
| Enlarged thyroid (goitre) | Enlarged thyroid (goitre) |
| Slow heartbeat | Rapid heartbeat |
| Weight gain | Weight loss |
| Constipation | Frequent bowel movements |
| Brittle nails | Soft nails Warm, moist palms<br>Tremor of fingers |
| **Further signs and symptoms** | |
| Arthritis | Difficulty sleeping |
| Cold intolerance | Heat intolerance |
| Depression | Nervousness |
| Dry skin | Irritability |
| Fatigue | Muscle weakness |
| Forgetfulness | Infertility |
| Heavy menstrual periods | Scant menstrual periods |
| Infertility | |
| Muscle aches | |

**Thyroid gland function**

Thyroid hormones are involved in regulation of vital body function. In general normal development, growth and reproduction cannot occur without them. Without the presence of thyroid hormones full effect of many other hormones cannot be realized. Growth can be an increase in cell size or an increase in the number of cells.

Thyroid function disorders are common, with a female: male ratio of 4:1.2.

The prevalence of hyperthyroidism in community based studies has been estimated at 2% for females and 0.2% for males, with as many as 15% of cases of hyperthyroidism occurring in

patients older than 60 years.3 The prevalence of hypothyroidism is 0.3% to 0.4%, increasing with age, and more females are affected.

The thyroid gland makes two thyroid hormones, triiodothyronine (T3) and thyroxine (T4). T3 is the active hormone and is made from T4. Thyroid hormones affect metabolism, brain development, breathing, heart and nervous system functions, body temperature, muscle strength, skin dryness, menstrual cycles, weight, and cholesterol levels.

Thyroid hormone production is regulated by thyroid-stimulating hormone (TSH), which is made by the pituitary gland in the brain. When thyroid hormone levels in the blood are low, the pituitary releases more TSH. When thyroid hormone levels are high, the pituitary responds by decreasing TSH production.

**How does pregnancy normally affect thyroid function?**

Two pregnancy-related hormones—human chorionic gonadotropin (hCG) and estrogen—cause increased thyroid hormone levels in the blood. Made by the placenta, hCG is similar to TSH and mildly stimulates the thyroid to produce more thyroid hormone. Increased estrogen produces higher levels of thyroid-binding globulin, also known as thyroxine-binding globulin, a protein that transports thyroid hormone in the blood.

These normal hormonal changes can sometimes make thyroid function tests during pregnancy difficult to interpret.

Thyroid hormone is critical to normal development of the baby's brain and nervous system. During the first trimester, the fetus depends on the mother's supply of thyroid hormone, which comes through the placenta. At around 12 weeks, the baby's thyroid begins to function on its own.

The thyroid enlarges slightly in healthy women during pregnancy, but not enough to be detected by a physical exam. A noticeably enlarged thyroid can be a sign of thyroid disease and should be evaluated. Thyroid problems can be difficult to diagnose in pregnancy due to higher levels of thyroid hormone in the blood, increased thyroid size, fatigue, and other symptoms common to both pregnancy and thyroid disorders.

**How does hyperthyroidism affect the mother and baby?**

Low birth Uncontrolled hyperthyroidism during pregnancy can lead to.

- congestive heart failure.
- preeclampsia—a dangerous rise in blood pressure in late pregnancy.
- thyroid storm—a sudden, severe worsening of symptoms.
- Miscarriage.
- premature birth.
- Weight.

Hyperthyroidism in a newborn can result in rapid heart rate, which can lead to heart failure; early closure of the soft spot in the skull; poor weight gain; irritability; and sometimes an enlarged thyroid that can press against the windpipe and interfere with breathing. Women with Graves' disease and their newborns should be closely monitored by their health care team.

**How is hyperthyroidism in pregnancy diagnosed?**

Health care providers diagnose hyperthyroidism in pregnant women by reviewing symptoms and doing blood tests to measure TSH, T3, and T4 levels.

Some symptoms of hyperthyroidism are common features in normal pregnancies, including increased heart rate, heat intolerance, and fatigue.

**Table 5: Thyroid hormones during pregnancy.**

| **TSH** | **1st trimester Normal or decreased** | **2nd trimester Normal** | **3rd trimester Normal** |
|---|---|---|---|
| Free T4 | Normal | Normal | Normal |
| Free T3 | Norma | Normal | Normal |
| Total T4 | High | High | High |
| Total T3 | High | High | High |

**Treatment for Thyroid disease**

Conventional treatment for Thyroid disease involves a lifelong medication or painful process. Although there are many alternative treatments, among all those treatments Thyroid treatment in Homeopathy is a good way to opt because it will have no side effects and also a painless procedure to control and get relief. While in homeopathy, we propose to treat the problem not by supplementing the deficiencies or surplus, but by reactivation of efficient Thyroid glandular function. Our immune system is also under constant attack from toxins within air, water and food supply.

These pollutants, over-stimulate our immune system, create autoimmune reactions and damage Thyroid function. In Homeopathy we provide constitutional treatment which focuses on improving the function of the Thyroid gland by natural means. The constitutional remedies will stimulate the body to reactivate Thyroid secretions. In our Thyroid treatment we will help to boost energy, improve circulation and thereby help balancing hypo as well as hypothyroid functions. It may be also used as a supportive help for regulating both hypo and hyper thyroid functions.

**Hyperthyroidism/Graves' Disease Treatments**

When your thyroid is acutely or chronically overactive a condition known as hyperthyroidism you are producing too much thyroid hormone.

Hyperthyroidism is most often due to the autoimmune condition known as Graves' disease, or in some cases due to thyroid nodules that produce excess thyroid hormone or thyroiditis.

Hyperthyroidism is treated by preventing the thyroid from overproducing hormone, reducing the thyroid's ability to produce hormone, or surgically removing it. Specifically, the treatments include.

- **Antithyroid drugs** including methimazole (Tapazole), propylthiouracil (PTU), and carbimazole (Neo-Mercazole). Because PTU is sometimes associated with some serious side effects, methimazole is considered the preferred antithyroid drug in the U.S. (PTU, however, is recommended for treatment during the first trimester of pregnancy due to a slightly increased risk of birth defects associated with methimazole.

- **Radioactive iodine treatment (RAI)** is also known as radioiodine ablation. This treatment involves taking a dose of radioactive iodine, which then is absorbed by the thyroid and destroys—or ablates—all or part of the gland's ability to manufacture thyroid hormone.
- Surgical removal of all or part of the thyroid, known as thyroidectomy.
- In some cases, debilitating hyperthyroidism symptoms like a rapid heart rate, palpitations, or elevated blood pressure are also treated with drugs known as beta blockers.

Generally, the approach used for treatment depends on the severity of your condition, whether you can tolerate antithyroid drugs, and if you're pregnant or planning to get pregnant soon.

Geography is also a factor, as you are more likely to be offered RAI in the United States—versus surgery or antithyroid drugs. In the U.S., surgery is rarely done for hyperthyroidism, unless you are pregnant and can't tolerate antithyroid drugs. Outside of the U.S., antithyroid drug therapy is more likely to be a practitioner's first choice for treatment, and surgery is more widely used, especially for children and women of childbearing age.

Some controversial, cutting-edge therapies for treatment include block/replace therapy (BRT)—a combination of thyroid hormone replacement drugs and antithyroid drugs—and a procedure known as thyroid arterial embolization.

Most thyroid patients who receive RAI treatment or have surgery eventually end up hypothyroid, and are treated with thyroid hormone replacement drugs.

Some integrative practitioners recommend stress reduction and management approaches like guided meditation, antithyroid dietary and nutritional changes, traditional Chinese medicine, and other holistic approaches to help an overactive thyroid.

**Natural Thyroid Treatments and Thyroid Home Remedies.**

- Often attributed to increased physical activity, patients affected with thyroid abnormalities should go for complete rest with proper dietary routine and relaxation.
- Certain relaxation techniques pertaining to 'yoga' and 'pranayam' serve to restore the balanced functioning of thyroid glands.
- Certain food items containing preservatives, white flour products and stuffs high on sugar should be avoided by thyroid patients.
- Food rich in Vitamin A such as pumpkin, green leafy vegetables and carrots add to the balanced functioning of thyroid gland.
- Diet should consist of sufficient helpings of fruits, sprouts and vegetables. Carbohydrates other than those contained by potatoes and whole wheat products should be avoided. Cakes, pastries, sweets and other calorie rich items should be avoided.
- Walnut which is rich in iodine and magnesium contributes to the balanced functioning of thyroid gland.
- 'Kelp' an iodine enriched sea weed belonging to the genus of algae is beneficial for both forms of thyroid malfunctioning. The sea weed can be used as an item of garnish as well as one for flavouring soups and salads.
- Like 'kelp'- Irish moss is also helpful for thyroid functioning.

- Another weed by the name of 'sushi' is also helpful from the point of view of hypothyroidism. The iodine content of the weed contributes to restoring the misbalance caused on account of hypothyroidism.
- Regular consumption of coconut oil added to milk, with two spoons being added to a cup of milk is another home remedy geared to the rectification of thyroid functioning.
- As part of rectification of thyroid functioning with natural remedies; sometimes the affected persons are advised to go on a juice based fast. This is done with the purpose of cleaning the system. Thus his diet then may consist of fruits juices such as apple, grapes and pineapples being served after every three to four hours.
- After five days of being on juice; he may be advised to include milk in his diet. There after he can go for proper balanced meals with insistence on fruits and vegetables.
- It is advisable that a person afflicted with thyroid malfunctioning should go for salads made out of sprouts, cucumber and carrot. Cucumber is very effective for patients diagnosed with goitre- a disease resulting from hypothyroidism.
- Besides including whole wheat as part of the carbohydrate consumption; if one is unable to avoid rice; the unpolished variety of rice should be included. But it is advisable to have it limited to once a day.
- Herbal tea with ginger is also beneficial for thyroid functioning. In fact, beverages including coffee, tea, carbonated drinks and alcohols should be avoided by patients afflicted with thyroid disorders. In its place herbal tea may be an alternative option.
- Barley and oats are also some of the healthy options for patients afflicted with thyroid functioning.
- Watercress with its enriched iodine content is also beneficial for thyroid malfunctioning.
- Regular consumption of water reed and lotus stem is also beneficial for thyroid functioning.
- For patients afflicted with goitre, exhibiting swelling around their neck; dandelion leaves with a touch of clarified butter may be wrapped around the affected region.
- Application of watercress's paste on the enlarged neck is also an effective remedy.
- For patients afflicted with hypothyroidism, it is imperative that along with medical counselling they include in their diet sufficient helpings of egg yolks, yeast and offal on account of their heightened copper content.
- Those afflicted with 'hyperthyroidism' should go for food items whereby they can block or obstruct the hyper activity of the gland. Thus their diet should consist of items such as

broccoli, cauliflower, cabbage and kale. These vegetables contain in them the essential 'blockers' which obstruct the hyper functioning of thyroid glands.

- Latest scientific research conducted on the malfunctioning of thyroid reveals the significance of certain marine plants in respect of striking balance in endocrine function. Phytoplankton and lyceum berry have been found to be useful in restoring the much needed balance.

**Ayurvedic Treatment for Thyroid**

According to Charaka, goitre does not strike those who take milk in adequate quantities. In addition, old rice, barley, moong dal, Bengal gram, cucumber, sugar juice, and milk products are recommended for a goitre patient. Sour and heavy substances are contraindicated.

**KANCHANARA** - Bauhinia veriegata (purple mountain ebony) is specific for proper functioning of thyroid. Among the other herbs jatamansi, Brahmi, guggulu and shilajita are also useful. Gokshura, Punarnava are useful herbs.

**Table 6: Treatment of Thyroid Disease in Pregnancy.**

| *Condition* | *Treatment* | *Treatment goal* | *Monitoring* | *Antepartum testing* |
|---|---|---|---|---|
| Hyperthyroidism | Methimazole (Tapazole); preferred agent after first trimester), 10 to 40 mg per day orally in two divided doses Propylthiouracil, 100 to 450 mg per day orally in two divided doses | Serum free thyroxine in upper one-third of normal range | Measurement of serum TSH and free thyroxine every two weeks until on stable medication dosage | Weekly beginning at 32 to 34 weeks' gestation in women with poorly controlled hyperthyroidism; consider testing earlier or more frequently in patients with other indications for testing |
| Hypothyroidism | Levothyroxine, 100 to 150 mcg per day orally | Serum TSH < 2.5 mIU per L | Measurement of serum TSH at 4 to 6 weeks' gestation, then every 4 to 6 weeks until 20 weeks' gestation and on stable medication dosage, then again at 24 to 28 weeks' and 32 to 34 weeks' gestation | Typically reserved for women with coexisting conditions or obstetric indications, and in patients with other indications for testing |

**Table 7: Benefit of various Asans in Hypothyroid patients.**

| Name of Asanas / kriyas | Benefits for hypothyroidic patient |
|---|---|
| ❖ Batrika Pranayama | Invigorating and wakes up body, mind and breath. |
| ❖ Surya Namaskara | brings energy and wake up body, mind and breath |
| ❖ Vrikshasana | Help with concentration |
| ❖ Utkatasana | Helps determination, mental and physical strength, and Is a good way to balance the lassitude and depression. It also activates the abdominal organs, which is needed to help the slow digestion. |
| ❖ Garudasana | To improve concentration, effect on the memory power |
| ❖ Trikonasana Classical | Improves function of the abdominal organs, helpful for digestion, and helps reducing waist fat |
| ❖ Parshvakonasana | Strengthens legs, waist and back muscles and activates abdominal organs, good to bring back muscle tone and continue with the digestive benefits. |
| ❖ Virabhadrasana | For hypothyroidic people in many ways: very good against depression, brings courage and determination, |
| ❖ Sirsasana | Gives energy, improves memory and has a beneficial effect on the circulation to the glands. |
| Bhujangasana breathing | Strengthen abdomen and back |
| Dhanurasana breathing and Dhanurasana | Activates the digestion, wakes up the abdominal area and helps relieve constipation. |
| Parighasana | Activates abdominal area and prepares for back bends |
| Ustrasana/Ardha Ustrasana | Good stretch on the throat, so good for the thyroid |
| Supta Virasana | Very good for the digestion |
| Paryankasana | Improves memory and stretches the throat |
| Pavanamuktasana Kriya breathing (wind release) | Good help for digestion and in case of constipation. Also, has a good effect on thyroid. |
| Chakrasana | Brings energy and helps to fight depression. Brings courage and mental strength |
| Rocking | To avoid back pain after Chakrasana. |
| Setubhandasana breathing and Setubhandasana | Beneficial effect on thyroid |

## CONCLUSION

Early detection of thyroid disease is important to prevent progression to life-threatening manifestations that include thyroid storm and myxedema coma. TSH serum concentration is the initial test of choice for evaluating thyroid function.Iodine deficiency can cause hypothyroidism development and has an important role in the course of pregnancy and foetal development. Early diagnosis and management of thyroid dysfunction in pregnancy is essential to avoid adverse maternal and fetal outcomes. The proper treatment of hyper- and hypothyroidism depends on recognition of the signs and symptoms of the disease and determination of the aetiology. The goal of therapy is to achieve euthyroidism with the fewest side-effects and the lowest incidence of either hypo- or hyperthyroidism. Antithyroid drugs are deceptively easy to use, but because of the variability in the response of patients and the

potentially serious side effects, all practitioners who prescribe the drugs need to have a working knowledge of their complex pharmacology.

**REFERENCES**


1. R.C. Smallridge and P.W. Ladenson, Hypothyroidism in Pregnancy: Consequences to Neonatal Health, JCE & M, 2001; 86: 6.
2. David S. Cooper, Antithyroid Drugs, N Engl J Med, 2005; 352: 905-17.
3. K Boelaert and J A Franklyn, Thyroid hormone in health and disease, Journal of Endocrinology, 2005; 187: 1–15.
4. 2006 Bernard M. Karnath, MD Nasir Hussain, Signs and Symptoms of Thyroid Dysfunction, Hospital Physician October 2006.
5. L. D. K. E. Premawardhana, J H Lazarus, Management of thyroid disorders, Postgrad Med J, 2006; 82: 552–558.
6. Joe George and Shashank R Joshi, Drugs and Thyroid, JAPI VOL. 55 MARCH 2007.
7. Elias S. Siraj, Update on the Diagnosis and Treatment of Hyperthyroidism, JCOM June 2008; 15(6).
8. Pralhad Kushtagi, Prashanth Adiga, Thyroid Disorders in Pregnancy, Indian Journal of Clinical Practice, Vol. 20, No. 6, November 2009.
9. Kostoglou-Athanassiou I, Ntalles K, Hypothyroidism - new aspects of an old disease, KAHIPPOKRATIA, 2010; 14(2): 82-87.
10. Ilse Truter, Clinical review: hyper- and hypothyroidism, S Afr Pharm J, 2011; 78(6): 10–14.
11. Komal PS, Mestman JH., Pregnancy and Thyroid Disease, Endocrine Practice, 2010; 16(1): 118–129.
12. Mirella Hage et.al., Thyroid Disorders and Diabetes Mellitus, Journal of Thyroid Research, 2011; Article ID 439463, 7 pages.
13. F. Bello and A. G. Bakari, Hypothyroidism in adults: A review and recent advances in management, Journal of Diabetes and Endocrinology, November 2012; 3(5): 57-69.
14. Isabela M Bensenor et.al., Hypothyroidism in the elderly: diagnosis and management, Clinical Interventions in Aging, 2012; 7 97–111.
15. Donny L.F. Changand Elizabeth N. Pearce, Screening for Maternal Thyroid Dysfunction in Pregnancy: A Review of the Clinical Evidence and Current Guidelines, Journal of Thyroid Research, 2013; ArticleID851326, 8pages.

16. Nagarathna P.K.M, Deepak Kumar Jha, Study on Antithyroid Property of Some Herbal Plants, Int. J. Pharm. Sci. Rev. Res, Nov – Dec 2013; 23(2): nº 36, 203-211.
17. Papaleontiou and Haymart, Approach to and Treatment of Thyroid Disorders in the Elderly, Med Clin North Am. 2012 March; 96(2): 297–310. doi:10.1016/j.mcna.2012.01.013.
18. Artak Labadzhyan et.al, Thyrotoxicosis of pregnancy, Journal of Clinical & Translational Endocrinology, 2014; 1: 140e144.
19. The American Thyroid Association (2), Thyroid Disease and Pregnancy.
20. The American Thyroid Association, Hyperthyroidism.
21. Rashmi Aggarwal et.al, Managing paediatric Graves' disease, Int J Res Med Sci, 2014 May; 2(2): 387-391.
22. Anna Abramova, Ramona Galsone, Hypothyroidism and pregnancy. Situation in Latvia, Int J Reprod Contracept Obstet Gynecol, 2015 Jun; 4(3): 540-546.
23. Tarun Sharma et.al., REVIEW OF AYURVEDIC DRUGS ACTING ON HYPOTHYROIDISM, IAMJ, 3(8): August-2015
24. Anshita Gupta et.al., HERBAL DRUGS FOR THYROID TREATMENT, IJPBS, JAN-MAR, 2016; 6(1): 62-70.
25. Aynadis AlemuP et.al, Thyroid hormone dysfunction during pregnancy, Int J Reprod Bio Med, November 2016; 14(11): 677-686.
26. Chang Hoon Yim, Update on the Management of Thyroid Disease during Pregnancy, Endocrinol Metab, 2016; 31: 386-391.
27. Efterpi Tingi et.al, Benign thyroid disease in pregnancy: A state of the art review, Journal of Clinical & Translational Endocrinology, 2016; 6: 37–49.
28. H. Khaled et al., A review on thyroid cancer during pregnancy: Multitasking is required, Journal of Advanced Research, 2016; 7: 565–570.
29. Katharine Stanley, Trust Guideline for: The Management of Thyroid Disease in Pregnancy, Clinical Effectiveness Committee - Clinical Governance Committee, 2016.
30. Won Sang Yoo and Hyun Kyung Chung, Recent Advances in Autoimmune Thyroid Diseases, Endocrinol Metab, 2016; 31: 379-385.
31. Ashish Sarode et.al., Thyroid disorders in type 2 diabetes mellitus, International Medical Journal, ISSN: 2348-2516, EISSN: 2348-1897, January 2017; 4(1): 64-68.
32. Deepthi B et. al., A Contemporary Review on Pregnancy Associated Disorders, J In Silico In Vitro Pharmacol, 2017; 3: 1.

33. Divya Kajaria, LIVER -THYROID -INSULIN AXIS IN DIABETES- AN UNEXPLORED LINK, World Journal of Pharmacy and Pharmaceutical Sciences, 2017; 6(8).
34. G. Pratheep et. al., HERBAL REMEDIES FOR VENPADAI VIRTILIGO, World Journal of Pharmacy and Pharmaceutical Sciences, 2017; 6(9).
35. Mr. Suraj Narayan Mali et al., Hypothyroidism and Alternative Treatment: An Overview, Ijsrm. Human, 2017; 6(1): 38-52.
36. Rajashree Mashru et.al., SARCODE THERAPY AS A RESTORATIVE OF HEALTH, World Journal of Pharmacy and Pharmaceutical Sciences, 2017; 6(8).
37. Rakhee Panda, De Quervain's Thyroiditis: Current Concepts and Ayurvedic Treatment Options, Int J Ayu Pharm Chem, 2017; 6(2).
38. Vandana Bharthi et.al, Herbal approach to management of thyroid disease - a review, Journal of Ayurvedic and Herbal Medicine 2017; 3(1): 48-52.
39. Yedukondalu Kollati et.al. Congenital Hypothyroidism: Facts, Facets & Therapy, Current Pharmaceutical Design, 2017; 23: 1-6.