



PHARMACOLOGICAL AND NON - PHARMACOLOGICAL STRATEGIES FOR MANAGING HYPOTHYROIDISM

KELGAONKAR PRAJAKTA N , INGOLE AKANGKSHA G , PATHAN ADIBA M.

SHIVLINGESHWAR COLLEGE OF PHARMACY, ALMALA, LATUR, MAHARASHTRA, INDIA- 413512.

ABSTRACT:

Hypothyroidism is common condition which occurs due to thyroid hormone deficiency. it also known as underactive thyroid. Clinical features may vary from no sign or symptoms to life threatening condition. Hypothyroidism can be easily diagnosed with blood test and it can be managed very well with medications like levothyroxine . If left untreated it can be fatal in some cases. Hypothyroidism affects women more than men. Nearly 42 million people in India are suffering from thyroid disorders. 1 in every 10 Indians suffers from Thyroid disorders.

The prevalence of hypothyroidism is 11% in India in comparison with other countries like United Kingdom it is only 2% and United States of America it is 4.6%. The high percentage of prevalence in India is possibly due to long standing iodine deficiency which has been corrected over only past 15-20 years. Pharmacological and non pharmacological therapies both can help in successfully managing the Hypothyroidism and Helps to improve the quality of life of patient.

KEYWORD: hypothyroidism, levothyroxine, iodine deficiency, fatal condition, pharmacological and non pharmacological strategies

INTRODUCTION:

Hyperthyroidism is a common condition which occurs due to thyroid hormone deficiency, it is also known as underactive thyroid. Thyroid gland is a butterfly shaped gland present in the lower front of neck which is regulated by pituitary gland. The pituitary gland secretes Thyroid Stimulating Hormone (TSH) . it stimulates the thyroid gland to secrete two types of hormones Triiodothyronine (T3) and Thyroxine (T4) in the bloodstream. These hormones help body to work properly by regulating the rate of metabolism and function of body organs. Every year 42 million people in India suffers from thyroid disorders. many studies have shown that the hypothyroidism is common in women, men also affects but less frequently.

The diagnosis and treatment of hypothyroidism is simple and is mostly carried out in primary care settings. Early diagnosis is Key to avoid damage or avoid worsening of symptoms in patient. Monotherapy of levothyroxine is used for the treatment of hypothyroidism. Few lifestyle management like proper and nutritious diet and exercise like yoga help in management of the disease and improve quality life of patient.

Causes of hypothyroidism:

The list may include primarily autoimmune thyroiditis, iodine deficiency, drugs (Thionamid, Aminodarone, Lithium, and Rifampin) and thyroid gland dysfunction.

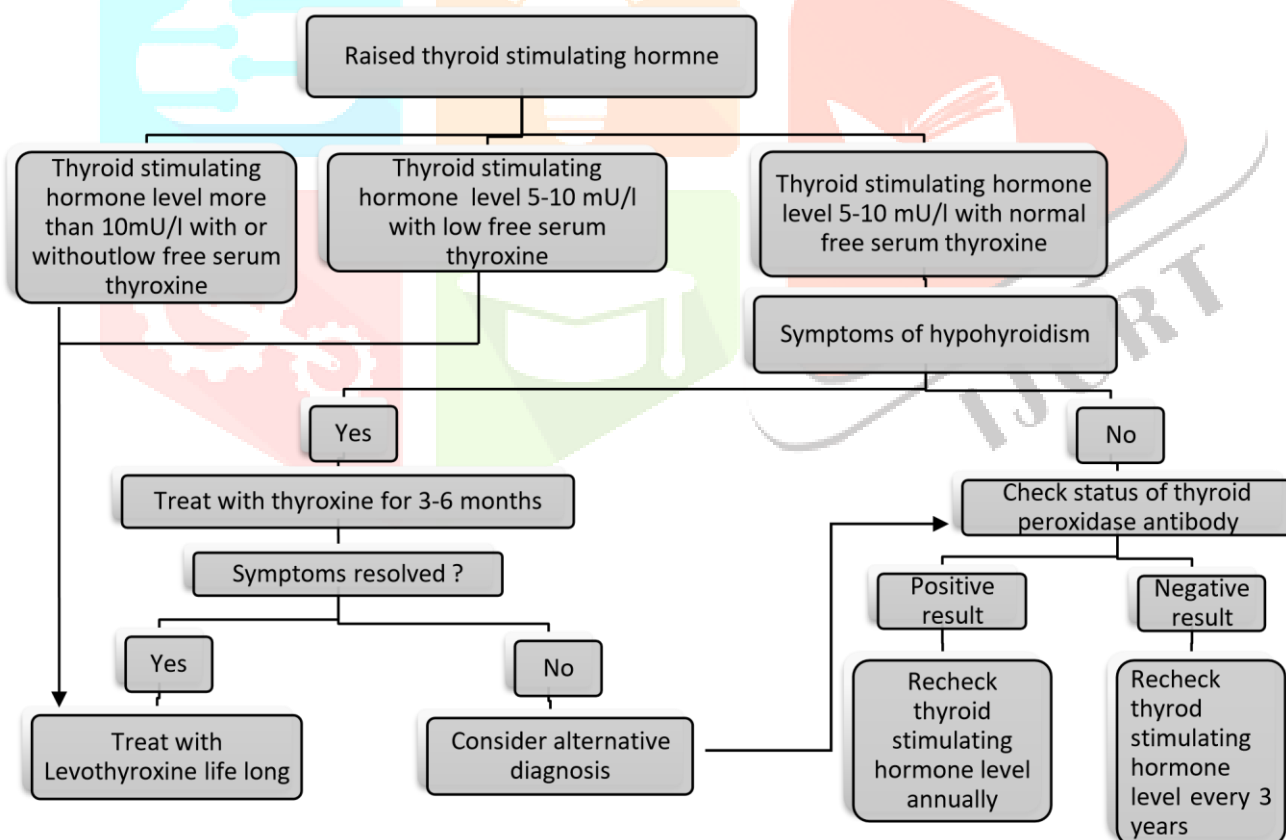
Clinical manifestation:

Early symptoms includes extreme hair loss, brittle nails, dry skin, tingling of finger, voice may become husky, loss of libido, menorrhagia. severe symptoms includes abnormal temperature and pulse rate , skin thickening, hair thinning and hair fall , deafness , constipation and weight gain.

Diagnostic evaluation:

1. History collection
2. Physical examination
3. Blood examination: Checking level of Triiodine (T3) and Thyroxine (T4) below reference range, Elevation of serum thyroid stimulating hormone (TSH) level above upper limit of reference range, Elevation in serum cholesterol

Pharmacological therapy of hyperthyroidism:



Monotherapy of levothyroxine is treatment of choice for hyperthyroidism. Levothyroxine half life is 7 days so it allows for daily dosing. Few studies have shown that patients with no significant comorbidities initiation of levothyroxine at full dose based on body weight is effective and safe, exception to this is elderly patients with ischemic heart disease. Levothyroxine is advised to take on an empty stomach half an hour before breakfast to avoid impairment of absorption by food. Now in certain studies have shown that taking levothyroxine at bedtime shows positive result in increasing Tetraiodothyronine (T4) and Triiodothyronine (T3) and decrease is mean Thyroid stimulation hormone (TSH) level.

After initiating levothyroxine therapy Thyroid stimulating hormone can take up to 4 month to normalize. it is recommended to check Thyroid Stimulating hormone levels in every 6 to 8 weeks after initiating therapy or after change in levothyroxine dose. when patient is on stable dose for long time check Thyroid stimulating hormone level annually.

Many medications and food and supplements interfere with the absorption of the drug levothyroxine, Drugs like Iron, calcium, aluminum, cholestyramine should be taken at least 4 hours apart from the levothyroxine. Some new drug therapies are also used in treatment of hyperthyroidism these are combination therapy of Triiodothyronine – levothyroxine, Desiccated pig thyroid extract, Triiodothyronine monotherapy but these are not as effective as monotherapy of levothyroxine.

Non pharmacological treatment of hypothyroidism:

Standard treatment of hypothyroidism is taking daily thyroid medication but this allopathic medicine often comes with a side effects. Forgetting to take medicine might leads more complications worsen the symptoms. natural remedies and some lifestyle modifications helps in restoring normal functioning of thyroid gland and they have over all positive impact on health of the person and help in managing the symptom of hypothyroidism. The goal of natural remedies is to fix the root cause of the disorder. Changing diet and taking herbal supplements are two ways to improve disease condition. These supplements have fewer side effects than allopathic medications. These supplements are useful for the people who haven't responding well to thyroid medications.

Avoid sugar in diet:

Processed food and sugar cause increase inflammation in the body. Inflammation slow down the conversion of thyroid hormones this can worsen the disease condition. Eliminating sugar from the diet has many health benefits and it also helps in managing thyroid. Some studies shows that removing sugar from diet helps in managing stress and improves skin. Using jaggery as a sweetener in limited amount instead of sugar shows wonders in health. Quitting sugar can help in weight loss.

Selenium:

Selenium is a trace element which plays important role in thyroid hormones metabolism. Taking selenium supplement has shown to help in balancing Triiodothyronine (T3) and Thyroxine (T4) levels in body.

Food items like tuna, Brazil nuts, grass fed beef contains enough amount of selenium.

Zinc:

Zinc is required for thyroid hormone production. Taking zinc supplement alone or in combination with selenium helps in improving thyroid function.

Following food items contains zinc red meat, legumes, nuts, Greek yogurt, shellfish, sesame seeds.

Vitamin B:

Hypothyroidism affects vitamin B12 levels in body. Taking vitamin B12 supplements helps in repairing damage caused by hypothyroidism. Vitamin B12 supplements helps with tiredness which is main symptom of hypothyroidism.

Following food items contains vitamin B beans, asparagus, sesame seeds, tuna, milk, cheese, egg.

Gluten free diet:

According to some studies people with thyroid disease have a celiac disease. Celiac disease is a digestive disorder in which gluten triggers immune response in Gastro intestinal Tract. Avoiding gluten products in diet helps in reducing the risk of celiac disease in thyroid patient, so instead of having wheat roti switch to jawar roti which has more health benefits.

Proper sleep:

Studies have shown that patients of hypothyroidism have disturbed sleep pattern. Getting proper 8 hour sleep at night helps in managing stress and anxiety and also helps in reducing symptoms of hypothyroidism. Sleeping at same time every day and sleeping early in night have positive effects on physical and mental health of a person. Taking turmeric milk at bedtime helps in managing insomnia.

Exercise and yoga for reversing hypothyroidism:

Apart from thyroid medication some exercises have proved to be beneficial in reducing hypothyroidism. It can be managed with some life style changes. Exercise like swimming, Pilates, brick pace, Zumba, walking helps in managing the symptoms of hypothyroidism.

Different asnas beneficial in hypothyroidism:**Viparita Karni (Inverted Pose):**

This pose is also known as leg up pose. It increases blood flow to the thyroid gland which helps in regulating the thyroid functions. It is helpful in reducing stress, insomnia and fights anxiety.

Setu bandhasana (bridge pose):

Setu bandhasana is an effective yoga for hypothyroidism. This pose is also helpful in treating headaches, asthma and depression. For optimum results, practice this asana empty stomach early in the morning.

Halasana (plough pose):

This asana cause stretching of the neck which helps in stimulating the thyroid gland. People with hyperthyroidism should avoid performing this pose. This pose helps in relaxing the autonomous nervous systems and also helps in strengthening abdominal muscles and back muscles.

Matsyasana (fish pose):

This asana is done by inverting the head. This pose stretches the throat and neck, it helps in increasing blood flow to the thyroid gland and stimulates thyroid gland.

Bhujangasana(cobra pose):

This pose is part of surya namaskar, This pose stretches neck and throat which helps in increasing thyroid functioning. Bhujangasana enhances blood circulation and it also helps in reducing stress and fatigue and prevent lung congestion.

Ustrasana(camel pose):

This pose helps in stimulating thyroid gland performing this yogaasana for thyroid can also helps in relieving disorders of spine.

Kapalbhati pranayama:

This pranayama is a type of breathing exercise helps in reliving many health related issues and it is also beneficial in treating hypothyroidism.

Dhanurasana (bow pose):

This yoga pose helps in stimulating thyroid gland for producing enough amount of thyroid hormone for controlling metabolism. This pose also helps in reducing stress, anxiety and relieving menstrual pain.

CONCLUSION:

With this review we can conclude that hypothyroidism can be well managed with pharmacological and non-pharmacological strategies like lifestyle modifications which are beneficial in managing and improving quality of life.

ACKNOWLEDGEMENT: N/A

SOURCE OF FINDING: N/A

REFERENCE:

1. Bath SC, Steer CD, Golding J, Emmett P, Rayman MP. Effect of inadequate iodine status in UK pregnant women on cognitive outcomes in their children: results from the Avon Longitudinal Study of Parents and Children (ALSPAC). *Lancet* 2013; 382: 331–37 [PubMed] [Google Scholar]
2. Caldwell KL, Pan Y, Mortensen ME, Makhmudov A, Merrill L, Moyer J. Iodine status in pregnant women in the National Children's study and in U.S. women (15–44- years), National Health and Nutrition Examination Survey 2005–2010. *Thyroid* 2013; 23: 927–37. [PMC free article] [PubMed] [Google Scholar]
3. Teng X, Shan Z, Chen Y, et al. More than adequate iodine intake may increase subclinical hypothyroidism and autoimmune thyroiditis: a cross-sectional study based on two Chinese communities with different iodine intake levels. *Eur J Endocrinol* 2011; 164: 943–50. [PubMed] [Google Scholar]
4. Zimmermann MB, Boelaert K. Iodine deficiency and thyroid disorders. *Lancet Diabetes Endocrinol* 2015; 3: 286– [PubMed] [Google Scholar]
5. Zhong B, Wang Y, Zhang G, Wang Z. Environmental iodine content, female sex and age are associated with new-onset amiodarone-induced hypothyroidism: a systematic review and meta-analysis of adverse reactions of amiodarone on the thyroid. *Cardiology* 2016; 134: 366–71. [PubMed] [Google Scholar]
6. Shine B, McKnight RF, Leaver L, Geddes JR. Long-term effects of lithium on renal, thyroid, and parathyroid function: a retrospective analysis of laboratory data. *Lancet* 2015; 386: 461–68. [PubMed] [Google Scholar]
7. Shulman KI, Sykora K, Gill SS, et al. New thyroxine treatment in older adults beginning lithium therapy: implications for clinical practice. *Am J Geriatr Psychiatry* 2005; 13: 299–304. [PubMed] [Google Scholar]
8. Shu M, Zai X, Zhang B, Wang R, Lin Z. Hypothyroidism side effect in patients treated with sunitinib or sorafenib: clinical and structural analyses. *PLoS One* 2016; 11: e0147048. [PMC free article] [PubMed] [Google Scholar]
9. Kahraman D, Keller C, Schneider C, et al. Development of hypothyroidism during long-term follow-up of patients with toxic nodular goitre after radioiodine therapy. *ClinEndocrinol* 2012; 76: 297–303. [PubMed] [Google Scholar]
10. Krohn T, Häscheid H, Müller B, et al. Maximum dose rate is a determinant of hypothyroidism after 131I therapy of Graves' disease but the total thyroid absorbed dose is not. *J ClinEndocrinolMetab* 2014; 99: 4109–15. [PubMed] [Google Scholar]
11. Lee V, Chan SY, Choi CW, et al. Dosimetric predictors of hypothyroidism after radical intensity-modulated radiation therapy for non-metastatic nasopharyngeal carcinoma. *ClinOncol (R CollRadiol)* 2016; 28: e52–60. [PubMed] [Google Scholar]
12. Vanderpump MP, Tunbridge WM, French JM, Appleton D, Bates D, Clark F, et al. The incidence of thyroid disorders in the community: a twenty-year follow-up of the Wickham survey. *ClinEndocrinol (Oxf)* 1995; 43: 55–68.
13. Information Centre for Health and Social Care. Prescription cost Analysis 2006. www.ic.nhs.uk/statisticsand-data-collections/Primary-care/prescriptions/prescription-cost-analysis-2006.

14. Canaris GJ, Manowitz NR, Mayor G, Ridgway EC. The Colorado thyroid Disease prevalence study. *Arch Intern Med* 2000;160:526-34.
15. Parle JV, Franklyn JA, Cross KW, Jones SR, Sheppard MC. Thyroxine Prescription in the community: serum thyroid stimulating hormone Level assays as an indicator of undertreatment or overtreatment. *Br J Gen Pract* 1993;43:107-9.
16. Aoki Y, Belin RM, Clickner R, Jeffries R, Phillips L, Mahaffey KR. Serum TSH and total T4 in the United States population and their association with participant characteristics: National Health and Nutrition Examination Survey (NHANES 1999–2002). *Thyroid* 2007; 17: 1211–23. [PubMed] [Google Scholar]
17. GarmendiaMadariaga A, Santos Palacios S, Guillén-Grima F, Galofré JC. The incidence and prevalence of thyroid dysfunction in Europe: a meta-analysis. *J ClinEndocrinolMetab* 2014; 99: 923–31. [PubMed] [Google Scholar]
18. Hollowell JG, Staehling NW, Flanders WD, et al. Serum TSH, T(4), and thyroid antibodies in the United States population (1988 to 1994): National Health and Nutrition Examination Survey (NHANES III). *J ClinEndocrinolMetab* 2002; 87: 489–99. [PubMed] [Google Scholar]
19. Laurberg P, Cerqueira C, Ovesen L, et al. Iodine intake as a determinant of thyroid disorders in populations. *Best Pract Res ClinEndocrinolMetab* 2010; 24: 13–27 [PubMed] [Google Scholar]
20. Teng W, Shan Z, Teng X, et al. Effect of iodine intake on thyroid diseases in China. *N Engl J Med* 2006; 354: 2783–93. [PubMed] [Google Scholar]
21. Sichieri R, Baima J, Marante T, de Vasconcellos MTL, Moura AS, Vaisman M. Low prevalence of hypothyroidism among black and Mulatto people in a population-based study of Brazilian women. *ClinEndocrinol* 2007; 66: 803–07 [PubMed] [Google Scholar]
22. McLeod DS, Caturegli P, Cooper DS, Matos PG, Hutfless S. Variation in rates of autoimmune thyroid disease by race/ethnicity in US military personnel. *JAMA* 2014; 311: 1563–65. [PubMed] [Google Scholar]
23. Carlé A, Pedersen IB, Knudsen N, et al. Moderate alcohol consumption may protect against overt autoimmune hypothyroidism: a population-based case-control study. *Eur J Endocrinol* 2012; 167: 483–90. [PubMed] [Google Scholar]
24. Asvold BO, Bjørø T, Nilsen TI, Vatten LJ. Tobacco smoking and thyroid function: a population-based study. *Arch Intern Med* 2007; 167: 1428–32. [PubMed] [Google Scholar]
25. Hansen PS, Brix TH, Sorensen TI, Kyvik KO, Hegedus L. Major genetic influence on the regulation of the pituitary-thyroid axis: a study of healthy Danish twins. *J ClinEndocrinolMetab* 2004; 89: 1181–87 [PubMed] [Google Scholar]
26. Panicker V, Wilson SG, Spector TD, et al. Heritability of serum TSH, free T4 and free T3 concentrations: a study of a large UK twin cohort. *ClinEndocrinol* 2008; 68: 652–59. [PubMed] [Google Scholar]
27. Porcu E, Medici M, Pistis G, et al. A meta-analysis of thyroid-related traits reveals novel loci and genderspecific differences in the regulation of thyroid function. *PLoS Genet* 2013; 9: e1003266. [PMC free article] [PubMed] [Google Scholar]
28. Carlé A, Pedersen IB, Knudsen N, et al. Hypothyroid symptoms fail to predict thyroid insufficiency in old people: a population-based case-control study. *Am J Med* 2016; 129: 1082–92. [PubMed] [Google Scholar]
29. Canaris GJ, Steiner JF, Ridgway EC. Do traditional symptoms of hypothyroidism correlate with biochemical disease? *J Gen Intern Med* 1997; 12: 544–50. [PMC free article] [PubMed] [Google Scholar]
30. Carlé A, Pedersen IB, Knudsen N, Perrild H, Ovesen L, Laurberg P. Hypothyroid symptoms and the likelihood of overt thyroid failure: a population-based case-control study. *Eur J Endocrinol* 2014; 171: 593– 602. [PubMed] [Google Scholar]
31. Gao X, Liu M, Qu A, et al. Native magnetic resonance T1-mapping identifies diffuse myocardial injury in hypothyroidism. *PLoS One* 2016; 11: e0151266. [PMC free article] [PubMed] [Google Scholar]
32. Tiller D, Ittermann T, Greiser KH, et al. Association of serum thyrotropin with anthropometric markers of obesity in the general population. *Thyroid* 2016; 26: 1205–14. [PubMed] [Google Scholar]
33. Shin YW, Choi YM, Kim HS, et al. Diminished quality of life and increased brain functional connectivity in patients with hypothyroidism after total thyroidectomy. *Thyroid* 2016; 26: 641–49. [PMC free article] [PubMed] [Google Scholar]

34. Rodondi N, den Elzen WPJ, Bauer DC, et al., for the Thyroid Studies Collaboration Study Group. Subclinical hypothyroidism and the risk of coronary heart disease and mortality. *JAMA* 2010; 304: 1365–74. [PMC free article] [PubMed] [Google Scholar]
35. Grossman A, Weiss A, Koren-Morag N, Shimon I, Beloosesky Y, Meyerovitch J. Subclinical thyroid disease and mortality in the elderly: a retrospective cohort study. *Am J Med* 2016; 129: 423–30. [PubMed] [Google Scholar]

