

Ayurvedic Management of Subclinical Hypothyroidism

Shankar Gautam, Bharat C Padhar, Ram Kishor Joshi

Department of Kayachikitsa, National Institute of Ayurveda, Jaipur, India



Corresponding Author:

Dr. Shankar Gautam, Email: dr.shankar.ayu@gmail.com

Abstract

Subclinical hypothyroidism (SCH), is characterized by normal triiodothyronine (T₃), tetraiodothyronine (T₄) levels and an abnormal increase of serum thyroid stimulating hormone (TSH). The prevalence of hypothyroidism in the developed world is about 4-5% and that of SCH is about 4-15% worldwide and it is increasing at an alarming rate. According to Ayurveda, poor function of Jatharagni and Dhatvagni (digestion and metabolism) produces Ama (advance glycation end products (AGEP) and toxic substances). Ama or AGEP interferes with the function of thyroid gland through interaction with thyroid receptors and causes malfunction of thyroid gland. A female patient of 30 years age, having complaints of weight gain, excessive appetite, fatigue, dry skin, irregular oligomenorrhea, and constipation along with 21.25 µIU/ml TSH; diagnosed as case of SCH and treated with Trikatu Powder. The contents of Trikatu Powder like; dry ginger, long pepper, and black pepper have shown their beneficial effect on the thyroid gland, and thus are intended to improve thyroid gland function by preventing the development of AGEP and assisting with digestion and metabolism correction. In the present case study, serum TSH level had been reduced to 4.88 µIU/ml, and decreased weight by 8.5 kgs with improvement in all associated symptoms like excessive appetite, hair fall, constipation, dry skin, oligomenorrhea and fatigue with treatment of Trikatu Powder for 4 months. The outcomes suggest that Trikatu powder may be beneficial to reduce serum TSH level, weight and mitigate associated symptoms in patients of SCH.

Keywords: Ayurveda, Hypothyroidism, Thyroid Disease, TSH, Trikatu

Access this article Online	Article Info.
QR Code	How to cite this article in Vancouver Style?
	Gautam S, Padhar BC, Joshi RK. Ayurvedic management of Subclinical Hypothyroidism: Ayurveda for Hypothyroidism. Journal of Karnali Academy of Health Sciences. 2021; 4(1)
	Received: 17 January 2021 Accepted: 29 April 2021 Published Online: 30 April 2021
	Source of Support: Self Conflict of Interest: None
<p>Copyright: © 2021 by author(s) in which author(s) are the sole owners of the copyright of the content published.</p> <p>Licensing: The Journal follow open access publishing policy, and available freely in the website of the Journal and is distributed under the terms of the Creative Commons Attribution International License 4.0 under the CC-BY 4.0  license, and the author(s) retain the ownership of the copyrights and publishing rights without restrictions for their content, and allow others to copy, use, print, share, modify, and distribute the content of the article even in commercial purpose as long as the original authors and the journal are properly cited.</p> <p>Disclaimer: The statements, opinions and data contained in this publication are solely those of the individual author(s) and contributor(s). Neither the publisher nor editor and reviewers are responsible for errors in the contents nor any consequences arising from the use of information contained in it. The Journal as well as publisher remain neutral with regards to any jurisdictional claims in any published articles, its contents and the institutional affiliations of the authors.</p>	

INTRODUCTION

Hypothyroidism (HT) is a common condition where the thyroid gland is underactive due to various causes like autoimmune, iatrogenic, iodine deficiency, transient thyroiditis.¹ Subclinical hypothyroidism (SCH), also known as mild hypothyroidism, is characterized by an increase of only TSH level. The common clinical finding of Hypothyroidism is weight gain whereas common symptoms are fatigue, cold intolerance, dry skin, dry hair, alopecia somnolence, depression, infertility and menorrhagia.¹

The prevalence of hypothyroidism in the developed world is about 4-5% and that of

SCH is about 4-15% worldwide whereas in India it is reported to being 11.4% for women and 6.2% for men.² India has a high prevalence of hypothyroidism, which is about 10%. It is much more common in females than males and lower in blacks than whites.³ Although new drugs and therapeutics are emerging for the management of HT, its prevalence is increasing at an alarming rate. There is a need to discover new effective medicine having lower side effects and every system of medicine must contribute to effective management.

PATIENT INFORMATION

Patient specific information.

A 30 years, married, non-smoking, non-alcoholic female consulted in Out Patient Department of National Institute of Ayurveda Hospital, Jaipur on 25th Sept 2019 with a chief complaint of weight gain for six months, excessive appetite for two months and associated complaints of irregular oligo-menorrhea, hair-fall and constipation for about six months.

Primary concerns and symptoms of the patient:

According to the patient, she was apparently well before six months. Then she had irregular oligo-menorrhea for six months which gradually increased every month. Before three months she had constipation, with hard and/or semisolid, 0-2 times per 1-2 days, and hair-fall started with gradual progression (assessed with the quantity of hair fall during washing and combing), without itching and dandruff. Then she got increased appetite (added 1-2 extra meals per day). These all complaints got aggravated day-by-day.

MHx- 3-4 days/_43-48 days

Relevant history: Patient had no history of addiction nor any drug intake history. There was no past history of any chronic illness like diabetes mellitus (DM), hypertension (HTN), pulmonary tuberculosis (PTB), and hasn't undergone any surgical interventions till now. Also there was no family history of DM, HTN, Thyroid diseases or other systemic diseases. She had constipated bowel habit for three months, bladder habit was clear, appetite was increased and sleep pattern was normal.

Relevant past interventions with outcomes:

She had no any history of past treatment and approached NIA Hospital for first consultation.

Clinical findings: The clinical findings are weight gain, excessive appetite, fatigue, irregular oligo-menorrhoea, constipation. Physical examination showed endomorph body structure with weight of 72 kg and height of 5'2". Her blood pressure was 140/90 mm of Hg, Pulse rate was 62/min and other vital signs were within normal limit. On examination she had dry skin, dry hair and delayed relaxation of reflexes.

Timeline: The detailed information from this episode of care organized as a timeline in Table No. 1.

Table 1: Timeline details of clinical features and management.

S.N.	Date	Clinical features/ Progress	Management
1.	18 th Sept 2019	Weight gain, Increased appetite (4-5 times diet/day) Irregular oligo-menorrhea, hair-fall and constipation On Examination- dry skin, dry hair, delayed relaxation of reflexes, BP 140/90 mm of Hg, Pulse rate: 62 beats/min, Wt. 72Kg Menstrual history- 3 - 4 days 28 + 15-20 days	Advice for Investigation- Thyroid function test Lipid profile
2.	25 th Sept 2019	BP- 142/90 mm of Hg, PR- 64 bpm Rest as it is.	Diagnosed as SCH Treatment: 1. Trikatu Churna 3 Gm twice a day with lukewarm water
3.	9 th Oct 2019	Weight got stabled (Wt. 72.1Kg) Rest complaints persist as it is. BP- 138/86mm of Hg, PR- 64bpm	1. Continued same treatment
4.	23 rd Oct 2019	Mild control in Hair fall. (assessed with the quantity of hair fall during washing and combing) Menstruation cycle delayed only for 10 days (28+10days) Wt. 71.4Kg BP: 140/98 mm of Hg, PR- 66 bpm	1. Continued same treatment 2. Advised for Thyroid function test.
5.	13 th Nov 2019	Appetite regulated (3times diet/day) Improvement in Hair fall Improvement present in dryness of skin and hair. BP: 136/84mm of Hg, PR- 70bpm, Wt: 70.1 Kg	TFT Report (11/11/2019) assessed 1. Continued same treatment
6.	4 th Dec 2019 18 th Dec 2019 2 nd Jan 2020	Improvement present in all complaints. Significant improvement present in Hair fall and oligo-menorrhoea. Menstrual cycle regulated within normal (28-35days)	1. Continued same treatment
7.	23 rd Jan 2020	Patient feeling better with no any dryness in skin and hair. Hair fall almost controlled to normal. Appetite normal. Wt: 64.2Kg	1. Continue same treatment Advised for TFT and Lipid profile.
8.	6 th Feb 2020	Complete relief in all symptoms and weight reduced to 63.5 kg. BP: 130/84 mm of hg PR: 70bpm	Report (05/02/2020) assessed Gradual tapering of medication started. Continued Trikatu Churna 2gms twice a day with lukewarm water.

Diagnostic Assessment

After analyzing the presenting signs and symptoms along with all the history of patients, we differentially diagnosed it as Hypothyroidism or Obesity. Thus, we had

further investigated the Thyroid function test and Lipid profile for confirmatory diagnosis. Early accurate diagnosis and treatment of hypothyroidism is crucial due to multiple manifestations, and is often challenging in

clinical practice; this challenge is even more in SCH. While TSH is the preferred test for diagnosing hypothyroidism, it may be misleading in certain situations; therefore, estimating T4 along with TSH is important for proper classification of a hypothyroid condition. With the presenting signs and symptoms, laboratory reports (Table 3) and with the diagnostic criteria of thyroid function test (TFT) (Table 2), we provisionally diagnosed her as a case of Subclinical hypothyroidism (SCH).

Therapeutic Intervention:

Based on the clinical presentation and laboratory investigations, being diagnosed as SCH we had planned to start our treatment with simple compound formulation of Shunthi (*Zingiber officinale*), Marich (*Piper nigrum*) and Pippali (*Piper longum*) in 1:1:1 ratio called as Trikatu churna in Ayurvedic pharmacopeia;

3 gm twice a day before meal with luke warm water. The powder was given freely from the outpatient dispensing section, NIA, Jaipur, prepared at GMP certified NIA pharmacy. Follow-up was taken once in 2-3 weeks for 5 months with no any change in therapeutic intervention.

Follow-up and Outcomes:

On the first follow up she had no any improvement in her complaints. But, later on in successive follow-ups she had got mild to significant improvements, which resulted to complete relief in around 4 months. The timeline of follow-ups and the assessed outcomes are mentioned in Table 1 and laboratory outcomes are mentioned in Table 3 and are shown in Graph 1. There was no any occurrence of adverse and anticipated events during the treatment period. The patient had no any difficulty in taking medicine.

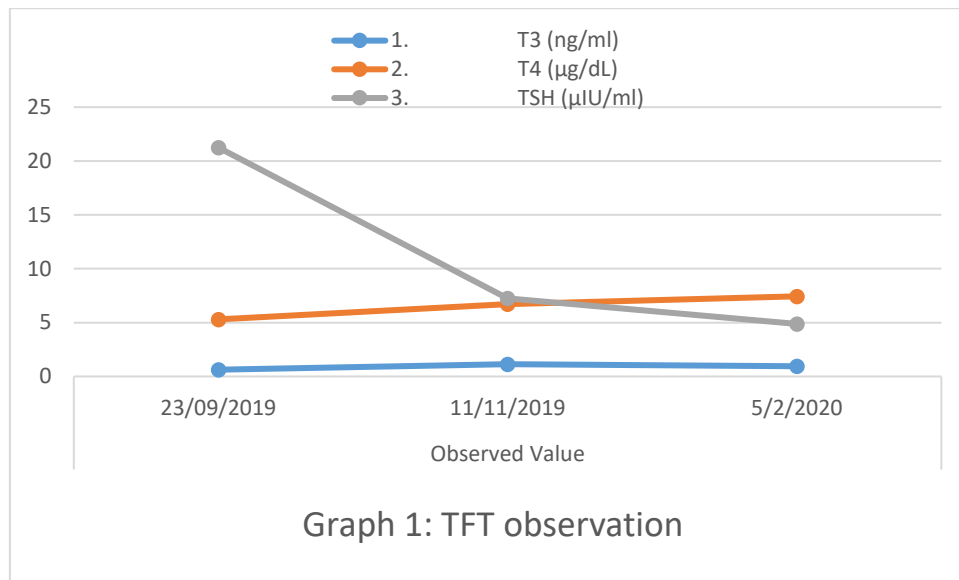
Table 2: Diagnostic Interpretation of TFT

Condition	TSH Level	Thyroid Hormones	Comments
Overt hypothyroidism	>4.5 mIU/L	Low T4	
Subclinical hypothyroidism	4.5 to 10 mIU/L	Normal T4	Mildly elevated TSH
Overt hyperthyroidism	≥10 mIU/L	Normal T4	Markedly elevated TSH
	<0.1 mIU/L or undetectable	Elevated T4 or T3	
Subclinical hyperthyroidism	<0.1 mIU/L	Normal T4 and T3	Clearly low serum TSH
	0.1 to 0.4 mIU/L	Normal T4 and T3	Low but detectable

Abbreviations: T3=triiodothyronine; T4=thyroxine; TSH=thyroid-stimulating hormone.

Table 3: Observation and Results.

S.N.	Test Done	Observed Value		
		23/09/2019	11/11/2019	05/02/2020
1.	T3 (ng/ml)	0.63	1.14	0.96
2.	T4 (µg/dL)	5.30	6.70	7.44
3.	TSH (µIU/ml)	21.25	7.25	4.88
4.	Total cholesterol (mg/dl)	252.3		211
5.	Triglyceride- Serum (mg/dl)	105.1		58.9
6.	HDL Cholesterol- Serum (mg/dl)	52.6		68.1
7.	VLDL Cholesterol- Serum (mg/dl)	21		11.8
8.	LDL Cholesterol-Serum (mg/dl)	178.7		131.1
9.	Total C./ HDL C. Ratio (%)	4.8		3.1
10.	LDL / HDL C. ratio	3.4		1.9



DISCUSSION

The patient was consuming high calorie diet like milk products, deep fried foods and had habit of daytime sleep almost 1-2 hours after lunch, Adhyasana (consuming food before complete digestion of previously taken food) and Avyayama (sedentary lifestyle). The etiological factors like intake of high calorie food, daytime sleep, Adhyasana and Avyayama vitiate the Medavaha Srotasa, Rasavaha Srotasa (micro channels for transportation of assimilated food and lipid contents) and Agni (digestion and metabolism), specifically Jatharagni, Rasa Dhatvagni and Meda Dhatvagni (digestion and cellular metabolism of fat). Poor function of Jatharagni and Dhatvagni (digestion and metabolism) produces Ama (advance glycation end products (AGEP) and toxic substances). This Ama or AGEP interferes with the function of thyroid gland through interaction with thyroid receptors and causes malfunction of thyroid gland. The causative factors also vitiate three body humours like Vata, Pitta and Kapha, dominantly Kapha though virtue of their qualities. Rasa Dhatu (nutritive substances assimilated in body) and Meda Dhatu (adipose tissues and fat contents)

vitiated through causative factors lead to abnormal supply of nutrients to thyroid gland and abnormal distribution of fat in body. Thus, AGEP and toxic substances produced due to disturbed metabolism and the excessive abnormal distribution and accumulation of fat in body area leads to obesity, PCOS, insulin resistance like conditions and also produces symptoms related to hypothyroidism.

Trikatu Churna is a polyherbal Ayurvedic formulation which is indicated in Ayurvedic classics for correcting digestion and metabolism. It is also used to treat diabetes, obesity and Kapha related disorders. The contents of Trikatu Churna like dry ginger, long pepper and black pepper are easily available, cost effective and used traditionally for treatment of various ailments safely. The recent researches on dry ginger, long pepper and black pepper also proved their positive action on thyroid gland and hence expected to prove function of thyroid gland through preventing production of advance glycation end products by helping with correction of digestion and metabolism.

The thyroid gland function i.e. hormone synthesis and release is regulated by TSH.

TSH binds to a particular membrane receptor located on the thyroid epithelial cell surface and triggers the mechanisms of cell signaling through the enzyme adenylate cyclase located in the plasma membrane. Adenylate cyclase activation raises the amounts of intracellular cyclic adenosine monophosphate (cAMP), which in turn induces additional intracellular signaling events that result in the development and secretion of thyroid hormones.⁴

Several studies show that there are interrelationships between oxidative stress, inflammation and thyroid derangement. Elevated malondialdehyde (MDA) levels and OS were reported in subclinical hypothyroidism.⁵ Another study also showed that MDA level is high in treatment-naïve primary hypothyroid patients. The stress marker is reduced to a large extent after treatment with L-thyroxine.⁶ It was demonstrated that the administration of antioxidants significantly increased in the circulating levels of T4 and T3.

The three herbs in this composition exhibit anti-oxidant activity in the following order; Piper nigrum > Piper longum > Zingiber officinale.⁷ Phosphodiesterases (PDEs) play a major role in the regulation (usually degrade) of cAMP and cyclic guanosine monophosphate (cGMP)-mediated pathways. The 6-gingerol, 8-Gingerol, and 6-Shogaol of ginger extract showed a PDE-inhibitory effect.⁸ The ginger has antioxidative activity and was presumed to play a role in subacute thyroiditis induction. Despite its experimental anti-oxidative and inhibitory effects on metabolic rate, which theoretically may lead to decreased thyroid hormone synthesis, in one study it was reported that ginger had stimulating action on thyroid gland was presumed to play a role in subacute thyroiditis induction.⁹ In addition, T3 and T4 increased,

while TSH decreased following ginger extract therapy; also there was amelioration of the toxic effects caused by Lambda-cyhalothrin (LCT) in the thyroid.¹⁰

Administration of piperine in Swiss albino mice recorded lowered thyroxine and triiodothyronine, serum levels of both the thyroid hormones, and was reported that piperine supplementation significantly reduced TSH, however the T4 and T3 level were increased.¹¹ In another study, it was reported that the administration of the Piper nigrum water extract significantly decreased the serum T3 and T4 concentrations in male mice; however, a significant increase in the concentration of the two hormones was observed following the administrations of the ethanol extract. These results clearly reveals that it has both thyroid-inhibitory as well as thyroid-stimulatory depending on the nature of the preparation.¹²

During the first follow up it was found that there was no any relief but later on patient had mild to significant relief in all signs and symptoms. Thus, the same medicine was continued for the next 4 months. The outcomes prognosis, and the medicine were evaluated in every follow-up and decided to continue the same medicine (Table 1). There was significant improvement observed in appetite and weight gain whereas improvement was also seen in hair fall, dry skin and dry hair within 3months. After treatment patient had complete relief in all symptoms and weight reduced to 63.5 kg. Also, there had been significant improvement of lipid profile.

Thus, from this case study and the literature review, we can conclude that the oral administration of Trikatu churna is effective in the treatment of SCH.

Patient Perspective:

The patient was thankful to us being happy with significant results and was under supervision for extra 2 months.

Informed Consent: The patient had signed informed consent form for the publication.

REFERENCES

1. Strachan MWJ, Newell Price JDC, Endocrinology. In: Ralston S.H., Penman I.D., Strachan M.W.J., Hobson R.P. Davidson's Principles and Practice of Medicine. 23rd edition, Elsevier publication, 2018; Chapter 18: pg.637-639.
2. Bembien DA, Hamm RM, Morgan L, Winn P, Davis A, Barton E. Thyroid disease in the elderly. Part 2. Predictability of subclinical hypothyroidism. J Fam Pract. 1994 Jun;38(6):583-8. PMID: 8195732..
3. Unnikrishnan AG, Kalra S, Sahay RK, Bantwal G, John M, Tewari N. Prevalence of hypothyroidism in adults: An epidemiological study in eight cities of India. Indian J Endocrinol Metab. 2013 Jul;17(4):647-52. <https://doi.org/10.4103/2230-8210.113755> PMID: 23961480; PMCID: PMC3743364.
4. Institute of Medicine (US) Committee on Medicare Coverage of Routine Thyroid Screening; Stone MB, Wallace RB, editors. Medicare Coverage of Routine Screening for Thyroid Dysfunction. Washington (DC): National Academies Press (US); 2003. 2, Pathophysiology and Diagnosis of Thyroid Disease. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK221541/> Accessed on April 9, 2021.
5. Mancini A, Di Segni C, Raimondo S, Olivieri G, Silvestrini A, Meucci E, Currò D. Thyroid Hormones, Oxidative Stress, and Inflammation. Mediators Inflamm. 2016;2016:6757154. <https://doi.org/10.1155/2016/6757154> Epub 2016 Mar 8. PMID: 27051079; PMCID: PMC4802023..
6. Chakrabarti SK, Ghosh S, Banerjee S, Mukherjee S, Chowdhury S. Oxidative stress in hypothyroid patients and the role of antioxidant supplementation. Indian J Endocrinol Metab. 2016 Sep-Oct;20(5):674-678. <https://doi.org/10.4103/2230-8210.190555> PMID: 27730079; PMCID: PMC5040049.
7. Natarajan KS, Narasimhan M, Shanmugasundaram KR, Shanmugasundaram ER. Antioxidant activity of a salt-spice-herbal mixture against free radical induction. J Ethnopharmacol. 2006 Apr 21;105(1-2):76-83. <https://doi.org/10.1016/j.jep.2005.09.043> Epub 2005 Dec 6. PMID: 16337350.
8. Röhrig T, Pacjuk O, Hernández-Huguet S, Körner J, Scherer K, Richling E. Inhibition of Cyclic Adenosine Monophosphate-Specific Phosphodiesterase by Various Food Plant-Derived Phytotherapeutic Agents. Medicines (Basel). 2017 Nov 4;4(4):80. <https://doi.org/10.3390/medicines4040080> PMID: 29113064; PMCID: PMC5750604.
9. Sanavi S, Afshar R. Subacute thyroiditis following ginger (Zingiber officinale) consumption. Int J Ayurveda Res. 2010 Jan;1(1):47-8. <https://doi.org/10.4103/0974-7788.59944> PMID: 20532098; PMCID: PMC2876930.
10. Al-Amoudi WM. Toxic effects of Lambda-cyhalothrin, on the rat thyroid: Involvement of oxidative stress and ameliorative effect of ginger extract. Toxicol Rep. 2018 Jun 12;5:728-736. <https://doi.org/10.1016/j.toxrep.2018.06.005> PMID: 29922588; PMCID: PMC6005809.
11. Ahmad N, Fazal H, Abbasi BH, Farooq S, Ali M, Khan MA. Biological role of Piper nigrum L. (Black pepper): A review. Asian Pacific Journal of Tropical Biomedicine 2012;2:1945-53. [https://doi.org/10.1016/S2221-1691\(12\)60524-3](https://doi.org/10.1016/S2221-1691(12)60524-3)
12. Panda S, Kar A. Water and ethanol extracts of Piper nigrum in regulating thyroid function and lipid peroxidation in mice. Pharmaceutical biology. 2003 Jan 1;41(7):479-82. <https://doi.org/10.1080/13880200308951338>