Original Research Article

Prevalence and biochemical profile of subclinical hypothyroidism among female patients attending OPD of a teaching hospital in Bihar: A hospital based observational study

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Abstract

Background: Hypothyroidism is one of the leading endocrine problems worldwide. Prevalence of high rates of subclinical hypothyroidism has been found in hilly areas. It leads increased risk of cardiovascular diseases, dyslipidemia and proneness to fractures.
Materials and methods: The present cross-sectional study was conducted upon female patients above the age of 18 years attending OPD and thorough clinical and biochemical evaluation of thyroid disease was done.
Results: 67.1% of the females were euthyroid. 27.2% suffered from hypothyroidism of which 9.1% was overt and 18.1% was subclinical in nature. Prevalence of subclinical hypothyroidism was higher when the age advanced.
Conclusion: The prevalence of subclinical hypothyroidism is high in this area.

Key words

Female, Prevalence, Subclinical hypothyroidism.

Introduction

Thyroid disorders are the leading endocrine problem worldwide. About 300 million people are suffering from thyroid disorders worldwide while in India the number of persons with thyroid problem is 42 million [1]. The pattern of thyroid dysfunction is determined by age, gender, geographical location and Iodine intake. Hypothyroidism is more common than hyperthyroidism. Autoimmune thyroiditis and Iodine deficiency are the two major contributors to this.

Hypothyroidism has broad clinical spectrum right from mild elevation of TSH and normal T3 and T4 without any clinical features at one end to myxedema and multi-organ failure at the other end. In subclinical hypothyroidism, thyroid stimulating hormone level is elevated while levels of free thyroxine and free triiodothyronine are normal. So, it is basically laboratory based diagnosis and the patients are usually asymptomatic [2]. Subclinical hypothyroidism is important because progression of subclinical hypothyroidism to overt hypothyroidism has been seen in 5 to 18% cases per year and the higher chances are there in those with higher initial TSH levels, positive antithyroid antibodies and history of radiation therapy [3]. Subclinical hypothyroidism is also associated with dyslipidemia, proneness to fractures, lung function abnormalities as well as cognitive problems. This condition is more common in females in whom the additional complications are uterine bleeding advanced pregnancy outcomes increase chances of preeclampsia [4]. The normal ranges for various tests related to thyroid function are- Free T_3 -75-220 mg/dl, Free T_4 - 4-11 mg/dl and TSH- 0.5-5 milliunits/l. TSH levels above 5 milliunit/l is the cut off level for diagnosing subclinical hypothyroidism.

Due to the complications associated with this condition, American thyroid Association has recommended routine screening for subclinical hypothyroidism above the age of 35 years every 5 years to ensure its early detection and to prevent associated complications [5]. Much research has not been done in India about subclinical hypothyroidism and subsequently the guidelines do not exist for screening of Indian population. It has been long debated whether clinical hypothyroidism will be beneficial or risky. Treatment of subclinical hypothyroidism helps in preventing progression to overt hypothyroidism, decrease in cardiovascular risk due to improvement in lipid profile and correction of cognitive abnormalities. However, the associated risks are over treatment, lack of real benefit and incidental increase in expenses. Textbook of Association of Physicians of India advocates for treatment of subclinical hypothyroidism cases with positive antibody test results in a reserved manner [6].

The prevalence of hypothyroidism is 4 to 5% while that of subclinical hypothyroidism is 3 to 15% as found by Ayala, et al. [7]. India adopted Universal salt iodization program in 1983 and since then the goitre prevalence has decreased significantly across the country. WHO has classified India as having optimal iodine nutrition as 83.2% urban and 66.1% rural households are consuming iodized salt adequately.

Menon, et al. [8] conducted a population-based study in Kochi to estimate the prevalence of hypothyroidism which was 3.9% and that of subclinical hypothyroidism was 9.4%. It was significantly higher in females (11.4%) than males (6.2%). It also increased with age. About 53% of subclinical hypothyroidism cases were positive for antithyroid antibodies. In the study conducted by Unnikrishnan, et al. [9] in 8 cities of India, the prevalence of hypothyroidism was 10.95% and that of subclinical hypothyroidism was 8.02 %. Inland cities showed higher prevalence of hypothyroidism as compared to coastal areas.

In the study conducted by Shekhar, et al. [10] in Rohtas district of Bihar, the prevalence of overt hypothyroidism found to be 8.3% and that of subclinical hypothyroidism was found to be 17%.

Kishanganj district of Bihar lies in sub Himalayan region. Studies regarding thyroid dysfunction and especially subclinical hypothyroidism have not been conducted in this area. Hence, this study will help in assessing the situation.

Aim and objectives

The present study was conducted to find the prevalence of subclinical hypothyroidism in patients reporting to MGM Medical College, Kishanganj, Bihar and to find its association with gender, age and clinical features.

Materials and methods

The present study was cross-sectional in nature conducted at Biochemistry department of MGM Medical College, Kishanganj, Bihar. Female patients above the age of 18 years attending OPD of this institution and giving consent to participate and take screening tests were included in this study. Subjects with previous history of thyroid disorders, pregnant ladies and subjects on chronic medications were excluded from the study. A total of 243 females were included.

They were evaluated by a detailed history and thorough clinical examination for evaluation of thyroid disease. Pretested proforma was used for data collection which included questions regarding various clinical features of thyroid dysfunction. Goiter staging was done based on the PAHO staging into 4 grades (0–III).

Relevant laboratory investigations were done. Taking aseptic precautions, overnight fasting venous blood sample was taken from antecubital vein of the patients after tying tourniquet in the arm. Blood was collected in plain vials without any additives and was allowed to clot for 30 minutes. Then, it was centrifuged at 3000 rpm for 10 minutes. Serum was separated from cells and collected in a separate aliquot vial and labelled carefully. Serum samples were assayed for levels of thyroid-stimulating hormone (TSH), triiodothyronine (T3), and thyroxine (T4). Assays of hormones were performed by enzyme-linked immunosorbent assay (ELISA) kit by enzyme immunoassay quantitative method. The assay procedures followed were as per kit inserts of the manufacturer. Hypothyroidism was classified as clinical if TSH was ≥ 4.5 μIU/ml) and FT4 was ≤ 0.620 ng/dL) and subclinical if TSH was ≥ 4.5 μIU/ml amd FT4 ≥ 0.620 ng/dL. Hyperthyroidism was classified as clinical if TSH was ≤ 0.1 μIU/ml and FT4 ≥ 1.705 ng/dL and subclinical if TSH was ≤ 0.1μIU/ml and FT4 ≥ 1.705 ng/dL. A TSH concentration of 0.1 – 0.4 μIU/ml was considered as mildly suppressed.

Microsoft Excel was used for data entry and SPSS v 16.0 for data analysis. The values of serum TSH, T3, and T4 were expressed as mean ± standard deviation. The various modes of clinical presentation were expressed as frequency and percentage of the total number of patients. Informed consent was obtained from all the enrolled patients enrolled and they were free to quit at any stage of the study. All the records were kept confidentially.

Results and Discussion

The present study included 243 female patients reporting to the institute during the study period were assessed. **Chart - 1** shows the thyroid status among the study subjects. 67.1% of the females were euthyroid. 27.2% suffered from hypothyroidism of which 9.1% was overt and 18.1% was subclinical in nature. 3.7% were hyperthyroid. **Table - 1** shows age-wise distribution of thyroid status among the study subjects. Highest rate of subclinical hypothyroidism was seen in the age group of 50 years and above while lowest rate was seen in the age group of less than 30 years. Prevalence of subclinical hypothyroidism was higher when the age advanced.

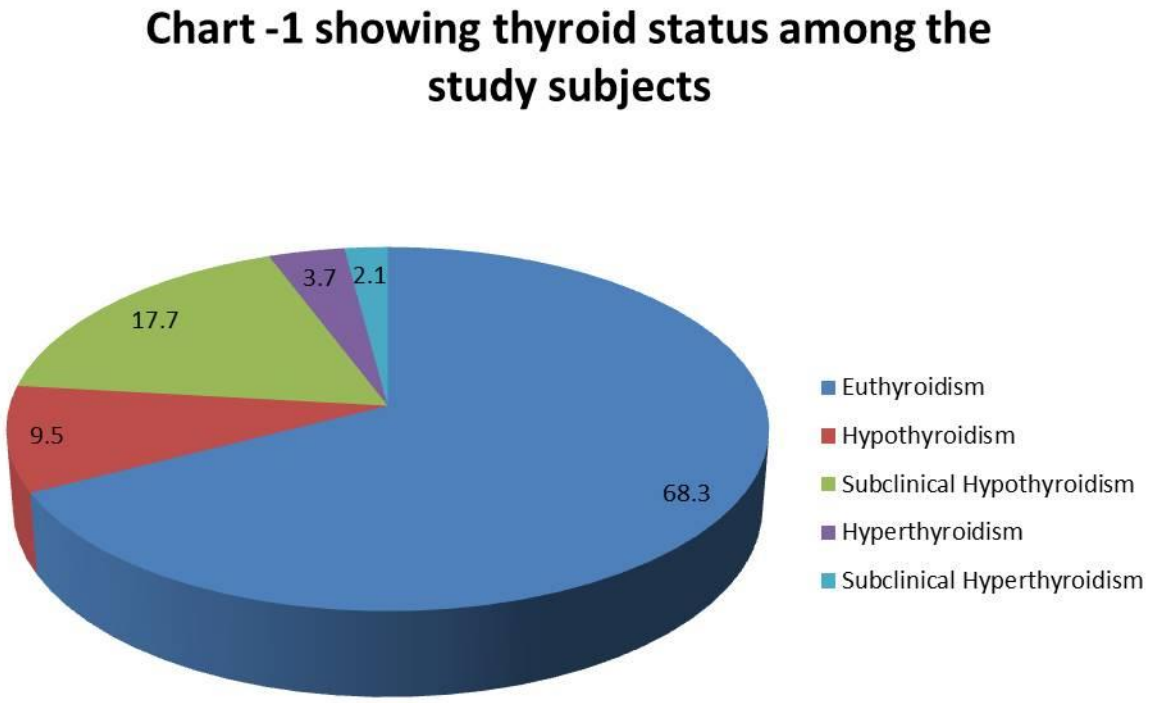
Senthilkumaran, et al. [11] studied subclinical hypothyroidism in rural women and found that that the prevalence of subclinical hypothyroidism in females is found to be 9%, which is more when compared to frank hypothyroidism and the

pattern of distribution of subclinical hypothyroidism increases as the age advances.

Velayutham, et al. [12] assessed the prevalence of thyroid dysfunction among young females in a south Indian population and observed that the prevalence of elevated TSH was 11% out of which 9.7% had mild TSH elevation. A low TSH was seen in 1.5% of the study population. Abraham, et al. [13] conducted a study on thyroid disorders in women of Puducherry and found that 84.2% were euthyroid and 11.5% were hypothyroid (2% clinical, 9.5% subclinical).

Table – 1: showing age-wise distribution of thyroid status among the study subjects.

Age in years	Euthyroidism	Hypothyroidism	Subclinical hypothyroidism	Hyperthyroidism	Subclinical hyperthyroidism	Total
<20	8	3	1	1	0	13
21-30	46	6	11	3	1	67
31-40	50	5	13	3	3	74
41-50	28	4	9	1	0	42
51-60	26	3	8	0	1	38
61 and above	5	1	2	1	0	9
Total	163	22	44	9	5	243



Chakrabarty, et al. [14] assessed thyroid function status in Indian adult nonpregnant females in Jharkhand. A total of 19.6% had biochemical evidence of thyroid disorder and 82.4% were euthyroid. Out of hypothyroid subjects, 3.2% had clinical and 14.4% had subclinical hypothyroidism. They opined that hypothyroidism, predominantly subclinical

hypothyroidism, is prevalent among women in this region. Mahanta, et al. [15] found in Assam that the prevalence of overt hypothyroidism was 10.9% and that of subclinical hypothyroidism was 13.1%. Male: female ratio was 1:3.

Unnikrishnan, et al. [9] conducted an epidemiological study in eight cities of India to find the prevalence of hypothyroidism in adults. They found that a significantly higher ($P < 0.05$) proportion of females vs. males (15.86% vs 5.02%) and older vs. younger (13.11% vs 7.53%), adults were diagnosed with hypothyroidism. Additionally, 8.02% patients were diagnosed to have subclinical hypothyroidism. Dhadhal, et al. [16] in Rajasthan observed that female patients and middle aged adults had significant association with hypothyroidism. Subclinical hypothyroidism and anti-TPO antibody positivity were the other common observations.

Thakur [17] commented that approximately 13% of random urban population of India belonging to mid to high socioeconomic strata carries subclinical hypothyroidism. They have elevated serum levels of LDL cholesterol and Triglycerides. This leads to the increased risk of CAD in them. They opined that screening of the general population to trace these subjects and treat subclinical hypothyroidism would be a new area of intervention. On the other hand,

Raza, et al. [5] of Pakistan concluded that the association between subclinical hypothyroidism and associated risk of various cardiovascular diseases (CVDs), pregnancy outcomes, neuropsychiatric issues, metabolic syndrome, and dyslipidemia is still not clear and hence, advocated for more large randomized clinical studies involving various age groups and medical condition, especially in developing countries.

Conclusion

The findings of the present study indicate that the prevalence of subclinical hypothyroidism is high in this area. Interventions are needed to timely detect these cases and to treat them adequately to prevent them from converting into frank hypothyroidism and other complications.

References

1. Nimmy NJ. A Survey on the Prevalence of Thyroid Disorder Induced by Demography and Food Habits in South Indian Population. Indian Journal of Pharmacy Practice, Apr-Jun 2012; 5(2): 49-52.
2. Braverman LE, Cooper DS. Introduction to hypothyroidism. In: Werner and Ingbar's the Thyroid: A Fundamental and Clinical Text. Wolters Kluwer (India) Pvt. Ltd., New Delhi, Lippincott, Willams and Wilkins; 2013, p. 523.
3. Ross DC. Subclinical hypothyroidism. In: Bravermen LE, Utiger RD, editors. Werner and Ingbar's the Thyroid. 7th edition, Philadelphia, PA: Lippencott-Raven; 1996, p. 1010-105.
4. Hak AE, Pols HAP, Visser TJ, Drexhage HA, Hoffman A, Witteman JCM. Subclinical hypothyroidism is an independent risk factor for atherosclerosis and myocardial infarction in elderly women: The Rotterdam Study. Ann Intern Med., 2000; 132: 270-78.
5. Raza SA, Mahmood N. Subclinical hypothyroidism: Controversies to consensus. Indian J Endocr Metab., 2013; 17: S636-42.
6. Gayathri R, Lavanya S, Raghavan K. Subclinical hypothyroidism and autoimmune thyroiditis in pregnancy - a study in South Indian subjects. J Assoc Physicians India, 2009; 57: 691–3.
7. Ayala AR, Danese MD, Ladenson PW. When to treat mild hypothyroidism. Endocrinol Metab Clin N Am., 2000; 29: 399-415.
8. Menon VU, Sundaram KR, Unnikrishnan AG, Jayakumar RV, Nair V, Kumar H. High prevalence of undetected thyroid disorders in an iodine

sufficient adult south Indian population. J Indian Med Assoc., 2009; 107: 72–7.

9. 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.
10. Shekhar S, Seema K, Prasad A, Tripathy S. Prevalence of Thyroid Disorders in Rohtas district of Bihar: A Hospital Based Study. JMSCR, 2018; 6(04): 590-7.
11. Senthilkumaran S, Sathyaprakash V, Sundhararajan A. A Study on Prevalence and Distribution of Subclinical Hypothyroidism in Rural Women. Sch. J. App. Med. Sci., 2015; 3(1D): 287-290.
12. Velayutham K, Selvan SS, Unnikrishnan AG. Prevalence of thyroid dysfunction among young females in a South Indian population. Indian J Endocr Metab., 2015; 19: 781-4.
13. Abraham R, Murugan VS, Pukazhvanthen P, Sen SK. Thyroid disorders in women of Puducherry. Indian Journal of Clinical Biochemistry, 2009; 24(1): 52-9.
14. Chakrabarty BK, Mitra B, Shahbabu B, Hazra N, Singh S. Thyroid Function Status in Indian Adult Nonpregnant Females in Ranchi, India. Indian J Med Biochem., 2017; 21(1): 25-29.
15. Mahanta A, Choudhury S, Choudhury SD. Prevalence of hypothyroidism in Assam: A clinic-based observational study. Thyroid Res Pract., 2017; 14: 63-70.
16. Dhadhal R, Mulchandani V, Parakh R, Joshee A, Mangukiya K, Bathwar N. A cross sectional study of prevalence of hypothyroidism In adult population of Udaipur district. G.J.B.B., 2015; 4(1): 103-106.
17. Thakur V. Subclinical hypothyroidism in India: an imperative risk for coronary artery disease (CAD). Open Acc J Thy Res., 2018; 2(1): 1–3.