

Original Article

Unveiling the Hidden Thyroid Burden : A Cross-sectional Study to Determine the Prevalence of Subclinical Hypothyroidism and Subclinical Hyperthyroidism at a Tertiary Care Center in Uttar Pradesh

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Abstract

Background : Subclinical Thyroid Disorders are increasingly recognized as important health concerns, yet their prevalence in Uttar Pradesh remains understudied.

Aims and Objective : This study was carried out to determine the prevalence of Subclinical Hypothyroidism and Subclinical Hyperthyroidism among patients attending a Tertiary Care Center in Uttar Pradesh.

Materials and Methods : A cross-sectional study was conducted on 196 patients aged more than 18 years. Serum Thyroid-stimulating Hormone (TSH), Free Thyroxine (FT4) and Free Triiodothyronine (FT3) levels were measured.

Results : The prevalence of Subclinical Hypothyroidism was 12.76% and Subclinical Hyperthyroidism was 3.06%. A female predominance was observed in both groups. Prevalence was highest in 31-40 years age group. The total thyroid dysfunction prevalence was 23.4%.

Conclusion : This study reveals a significant prevalence of Subclinical Thyroid Disorders in Uttar Pradesh, emphasizing the need for routine thyroid function screening, especially among women and older adults.

Key words : Subclinical Hypothyroidism (SCH), Subclinical Hyperthyroidism (SCHyper), Thyroid Stimulating Hormone (TSH), Free Triiodothyronine (FT3), Free Thyroxine (FT4).

Thyroid disorders represent a significant public health challenge Worldwide, with subclinical forms gaining increasing attention due to their subtle yet potentially impactful nature¹. In India, the prevalence of thyroid disorders varies considerably across different regions, influenced by factors such as Iodine intake, environmental conditions, and genetic predisposition^{1,2}.

Subclinical Hypothyroidism (SCH), defined by elevated Thyroid Stimulating Hormone (TSH) levels with normal free Thyroxine (FT4) levels, has been associated with an increased risk of cardiovascular diseases, dyslipidemia, and adverse pregnancy outcomes^{3,4}. Subclinical Hyperthyroidism, characterized by suppressed TSH levels with normal FT4 levels, has been linked to osteoporosis, atrial fibrillation and other cardiovascular complications⁵⁻⁷.

The clinical significance of these subclinical disorders lies in their potential progression to overt thyroid dysfunction and the associated health risks. Early detection through screening can facilitate timely interventions, potentially preventing complications and improving overall health

Editor's Comment :

- Subclinical Thyroid Disorders are prevalent in our community. Women are at higher risk.
- Routine thyroid screening is crucial, especially for women and older adults.

outcomes⁸. However, the absence of specific symptoms often leads to these conditions going undetected, highlighting the importance of routine screening, especially in high-risk populations.

Despite the growing recognition of Subclinical Thyroid Disorders' importance, there is a paucity of data on their prevalence in many parts of India, including Uttar Pradesh. Existing studies may not reflect the current demographic pattern relevant to specific regions within the state. This knowledge gap hampers the development of targeted screening strategies and management guidelines tailored to local needs.

The present study aims to address this research gap by estimating the prevalence of Subclinical Hypothyroidism and Subclinical Hyperthyroidism among patients attending a Tertiary Care Center in Agra, Uttar Pradesh. By elucidating the prevalence rates and associated demographic factors, this study seeks to contribute valuable data to inform clinical practice, guide public health initiatives, and serve as a foundation for future research in the region.

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MATERIALS AND METHODS

Study Design and Setting :

We conducted a cross-sectional study at our Tertiary Care Center in Agra, Uttar Pradesh. The study protocol was approved by the Institutional Ethics Committee, and all procedures were performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

Study Population :

The study was conducted on 196 patients. Patients aged more than 18 years attending both Outpatient and Inpatient Departments of our hospital were eligible for inclusion. We excluded pregnant women, patients with known thyroid disorders (Overt Hypothyroidism or Hyperthyroidism) and those unable to provide informed consent.

Data Collection :

After obtaining written informed consent, a structured questionnaire was used to collect demographic data (age, gender) and relevant medical history. Blood samples were collected for Thyroid Function Tests, including serum TSH, FT4 and FT3 levels, using standardized assays.

Diagnostic Criteria :

- Subclinical Hypothyroidism: TSH levels above 4.68 μ IU/mL with normal FT4 levels.
- Subclinical Hyperthyroidism: TSH levels below 0.46 μ IU/mL with normal FT4 levels.
- Normal thyroid function: TSH levels within the range of 0.46-4.68 μ IU/mL with normal FT4 levels.

Statistical Analysis :

Data were analyzed using MS Excel and R software. Prevalence rates were calculated with corresponding 95% confidence intervals. Continuous variables were described using means, medians, and Standard Deviations, while categorical variables were presented as frequencies and percentages. Chi-square test, Z-test and Cochran-Armitage test for trend were used to compare the proportion of thyroid dysfunction in different age groups, as appropriate. A p-value <0.05 was considered statistically significant.

RESULTS

Demographic Characteristics :

A total of 196 patients were included in the study. The mean age of the study population was 45.8 ± 12.3 years, with 62.75% (123/196) being females and 37.25% (73/196) being males (Table 1).

Prevalence of Thyroid Disorders :

Out of 196 patients screened, 25 (12.76%) were diagnosed with Subclinical Hypothyroidism, and 6 (3.06%) with Subclinical Hyperthyroidism. Additionally, 9 (4.59%) patients had Clinical Hypothyroidism, 4 (2.04%) had Clinical Hyperthyroidism and 2 (1.02%) were unclassified. The remaining 150 (76.53%) patients were euthyroid.

Subclinical Hypothyroidism and Subclinical Hyperthyroidism :

All the results have been summarized in Table 2.

Gender Distribution :

A statistically significant difference was observed in the gender distribution of Subclinical Thyroid Disorders ($p < 0.01$). Women were more likely to have Subclinical Hypothyroidism (OR: 2.1) and Subclinical Hyperthyroidism (OR: 3.2) compared to men.

Table 1 — Demographic characteristics of the study population

Number of patients	196
Males	73 (37.25%)
Females	123 (62.75%)
Mean Age (years)	45.8 \pm 12.3 years

Table 2 — Characteristics of patients with Subclinical Hypothyroidism and Subclinical Hyperthyroidism

Characteristic	Subclinical Hypothyroidism (SCH)	Subclinical Hyperthyroidism (SCHyper)
Number of patients	25	6
Males	6 (24%)	1 (16.67%)
Females	19 (76%)	5 (83.33%)
Mean age (years)	46.36 \pm 13.7	48.67 \pm 18.2
Mean TSH (μ IU/mL)	7.17 \pm 2.8	0.27 \pm 0.16
TSH range (μ IU/mL)	4.76-17.71	0.05-0.43
Mean FT3 (pg/mL)	3.78 \pm 0.6	4.04 \pm 0.8
FT3 range (pg/mL)	2.91-5.04	2.81-4.89
Mean FT4 (pmol/L)	16.25 \pm 2.7	18.77 \pm 3.1
FT4 range (pmol/L)	12.20-23.55	13.94-22.60

Table 3 — Distribution of thyroid dysfunction in different age groups

Age	No of patients	Euthyroidism	Clinical Hypothyroidism	SCH	Clinical Hyperthyroidism	SCHyper	Unclass-ified	TTD	Percentage
18-30	64	56	2	3	1	2	0	8	12.5%
31-40	28	18	3	7	0	0	0	10	35.7%
41-50	46	34	0	8	2	1	1	12	26.1%
51-60	34	25	1	5	1	2	0	9	26.4%
>60	24	17	2	2	1	1	1	7	29.1%
Total	196	150	8	25	5	6	2	46	23.4%

SCH : Subclinical Hypothyroidism, SCHyper : Subclinical Hyperthyroidism, TTD : Total Thyroid Dysfunction

Age Distribution :

Compared to the 18-30 age group, all other age groups show higher odds of thyroid dysfunction (Table 3). The 31-40 age group has a significantly higher odds ratio (3.89) with a p-value < 0.05. Other age groups show elevated odds ratios, but they are not statistically significant at the 0.05 level. Cochran-Armitage test for trend showed a statistically significant (p=0.03) linear trend in the proportion of thyroid dysfunction as age increases.

DISCUSSION

This cross-sectional study provides valuable insights into the prevalence of subclinical thyroid disorders among patients attending a Tertiary Care Center in Agra, Uttar Pradesh. Our findings reveal a considerable prevalence of Subclinical Hypothyroidism (12.76%) and Subclinical Hyperthyroidism (3.06%) in this population.

The prevalence of SCH in our study falls within the range of 3-16.9% reported by various studies across India⁹⁻¹³ and prevalence of SCHyper (3.06%) aligns with the Global prevalence range of 0.2-11.3% reported by Carlé, *et al*¹⁴ but if Indian data is concerned, it is more than the prevalence (1.6%) reported in a study conducted in Cochin by Unnikrishnan, *et al*¹.

The female predominance observed in both SCH (76%) and SCHyper (83.33%) groups is consistent with previous studies, suggesting a higher susceptibility of women to thyroid disorders¹⁵. This gender disparity could be attributed to various factors, including hormonal influences, autoimmune predisposition, and pregnancy-related changes in thyroid function.

The mean age of patients with SCH (46.36 years) and SCHyper (48.67 years) in our study suggests that middle-aged and older adults may be at higher risk for these conditions. This finding is in line with other studies that have reported an increased prevalence of thyroid disorders with advancing age^{15,16}.

Clinical Significance :

The clinical significance of our findings lies in the potential health implications of Subclinical Thyroid Disorders. SCH has been associated with an increased risk of progression to overt hypothyroidism, adverse cardiovascular outcomes³, dyslipidemia⁴, Non-alcoholic Fatty Liver Disease¹⁷ and neuropsychological impairments¹⁸. Similarly, SCHyper may lead to osteoporosis, atrial fibrillation, other cardiovascular complications and progression to overt thyrotoxicosis, if left untreated^{5,6}.

Our study highlights the importance of routine thyroid function screening, especially in women and older adults. Early detection of Subclinical Thyroid Disorders can facilitate timely interventions, potentially preventing

progression to overt disease and associated complications. This is particularly relevant in the context of India's ongoing nutrition transition and increasing life expectancy, which may influence the prevalence and impact of thyroid disorders.

Strengths and Limitations :

The strengths of our study include its focus on a specific region (Agra, Uttar Pradesh) where data on Subclinical Thyroid Disorders is not available. No study has been conducted in North India to determine the prevalence of Subclinical Hyperthyroidism till date. However, our study has several limitations. First, the single-center design and relatively small sample size limit the generalizability of our findings to the broader population of Uttar Pradesh. Second, we did not assess factors such as Iodine intake, autoimmune status, or family history, which could provide further insights into the etiology of Subclinical Thyroid disorders in this population. Third, the cross-sectional nature of the study precludes any conclusions about causality or the natural history of subclinical thyroid disorders in this population.

CONCLUSION

This study reveals a significant prevalence of Subclinical Hypothyroidism and Subclinical Hyperthyroidism among patients attending a Tertiary Care Center in Agra, Uttar Pradesh. The observed female predominance and age distribution patterns align with existing literature, highlighting the need for targeted screening strategies. These findings underscore the importance of routine thyroid function testing, especially in women and older adults, to enable early detection and management of Subclinical Thyroid Disorders.

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Conflict of Interest : None.

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