



Original Research Article

## A Cross-Sectional Study of Prevalence of Hypothyroidism in Adult Population of Bhopal

Bhavna Bhimte, Amrita Vamne, B.K.Agrawal, R.C.Thanna

Department of Biochemistry, Gandhi Medical College, Bhopal, M.P, India

Corresponding Author: Bhavna Bhimte

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### ABSTRACT

**Background:** Thyroid dysfunction is relatively a common disease which affects people, irrespective of their age and gender. Hypothyroidism is a common metabolic disorder which is existent in the general population

**Objective:** To determine the prevalence of hypothyroidism in adults in Bhopal city of Madhya Pradesh..

**Methods & Material:** A cross-sectional study was conducted in patients referred to central lab of Gandhi medical college and hospital, Bhopal, M.P to study the prevalence of hypothyroidism. T3,T4 and TSH was measured by ELISA from blood sample. Patients with history of hypothyroidism or those with serum T4 <5 ng/ml and TSH>5.50  $\mu$ U/ml, were categorized as hypothyroid. The prevalence of subclinical hypothyroidism and anti-thyroid peroxidase (anti-TPO) antibody positivity was also assessed.

**Observations & Discussion:** A total of 300 adult patients  $\geq$ 18 years of age were evaluated (mean age: 38 years; 88% females). The overall prevalence of hypothyroidism was 9.33% (n=28) of which 5.66% (n=17) patients self-reported the condition, whereas 3.67% (n=11) were previously undetected. A significantly higher proportion of females (89.28%) vs. males were diagnosed with hypothyroidism. Additionally, 4% (n=12) patients were diagnosed to have subclinical hypothyroidism (normal serum T4 and TSH>5.50  $\mu$ IU/ml). Anti-TPO antibodies suggesting autoimmunity were detected in 56 patients (20.66%).

**Conclusion:** Female patients and middle aged adults had significant association with hypothyroidism. Subclinical hypothyroidism and anti-TPO antibody positivity were the other common observations.

**Key words:** Thyroid disorder, Bhopal.

### INTRODUCTION

Thyroid dysfunction is relatively a common disease which affects people, irrespective of their age and gender. Hypothyroidism is a common metabolic disorder which is existent in the general population. Hypothyroidism is characterized by a broad clinical spectrum ranging from an overt state of myxedema, end-organ

effects and multisystem failure to an asymptomatic or subclinical condition with normal levels of thyroxine and triiodothyronine and mildly elevated levels of serum thyrotropin. [1-4] The prevalence of hypothyroidism in the developed world is about 4-5%. [5,6] The prevalence of subclinical hypothyroidism in the developed world is about 4-15%. [5,7] In a developing

and densely populated country like India, communicable diseases are priority health concerns due to their large contribution to the national disease burden. [8] In India, hypothyroidism was usually categorized under the cluster of iodine deficient disorders (IDDs), which were represented in terms of total goiter rates and urinary iodine concentrations, typically assessed in school-aged children. [9-11] Ever since India adopted the universal salt iodization program in 1983, [12] there has been a decline in goiter prevalence in several parts of the country, which were previously endemic. [13-15] In 2004, a WHO assessment of global iodine status classified India as having 'optimal' iodine nutrition, [16,17] with a majority of households (83.2% urban and 66.1% rural) now consuming adequate iodized salt [18,19] India is supposedly undergoing a transition from iodine deficiency to sufficiency state.

A recent review of studies conducted in the post-iodization phase gives some indication of the corresponding change in the thyroid status of the Indian population. [20] However, most of these studies are limited to certain geographical areas or cities, and undertaken in children with modest sample sizes. [21-24] There have been no nationwide studies on the prevalence of hypothyroidism from India, either in the pre- or post-iodization periods. A large, cross-sectional, comprehensive study was required to provide a true picture of the evolving profile of thyroid disorders across the whole country, especially as the country is in the post-iodization era.

## MATERIALS AND METHODS

This was a cross-sectional, epidemiological study conducted in Bhopal at Gandhi medical college & hospital. A total 300 cases of thyroid abnormality were found during this study period. The data was collected from patients that referred to central laboratory of our hospital for thyroid

function tests and retrospective data collected from department records.

All patients referred to our department underwent medical history assessment, a general physical examination (including thyroid gland examination) and laboratory investigations including hematological and biochemical investigations.

Assays for thyroid hormone (T3, T4 and TSH) were performed by ELISA technology using Biorad ELISA reader. Anti-TPO antibodies were also measured by same analyzer.

Based on previous thyroid history and current thyroid function test results, participants were classified using following definitions:

- *Hypothyroid*: Serum thyroxine (T4)  $\leq 5$  ng/ml and thyroid stimulation hormone (TSH)  $\geq 5.50 \mu\text{U/mL}$ ,
- *Hyperthyroid*: Serum T4  $> 14$  ng/ml and TSH  $< 0.35 \mu\text{IU/mL}$ ,
- *Subclinical hypothyroidism*: Normal serum T4 and TSH  $> 5.50 \mu\text{IU/mL}$ .
- *Subclinical hyperthyroidism*: Normal serum T4 and TSH  $< 0.35 \mu\text{IU/mL}$ ,
- *Anti-TPO antibody positive*: Presence of anti-TPO antibodies above 35 IU/ml.

### Statistical analysis

The prevalence of hypothyroidism and other thyroid disorders was summarized as counts and percentages. Similar analyses were performed for SCH (subclinical hypothyroid) and anti-TPO antibody positivity.

## RESULTS

All obtained data are analyzed by using Microsoft excel for calculating prevalence of disease. (In a form of percentage) Percentage was calculated by using electronic percentage calculator.

**Table 1: Age wise distribution of study group**

Age group	No.of Subjects(n)	%(percentage)
20-39 years	130	43.33
40-64 years	138	46
65 and above	32	10.67

**Table 2: Distribution of patients based on history of thyroid disease**

History	No.of Subjects	%(percentage)
Goitre	116	65.33
Thyroiditis	44	14.67
Thyroid malignancy	17	5.67

**Table 3: Prevalence of thyroid disorders in Bhopal**

Thyroid disorder	No.of Subjects	%(percentage)
Hypothyroid	32	10.66
Subclinical hypothyroidism	15	5
Hyperthyroid	19	6.33
Subclinical hyperthyroidism	16	5.34
Anti-TPO positivity	62	20.66

A total of 300 adult patients  $\geq 18$  years of age were evaluated (mean age: 38 years; 88% females).

The overall prevalence of hypothyroidism was 9.33% (n=28) of which 5.66% (n=17) patients self-reported the condition, whereas 3.67% (n=11) were previously undetected. A significantly higher proportion of females (89.28%) vs. males were diagnosed with hypothyroidism. Additionally, 4% (n=12) patients were diagnosed to have subclinical hypothyroidism (normal serum T4 and TSH $>5.50$   $\mu$ IU/ml). Anti-TPO antibodies suggesting autoimmunity were detected in 56 patients (20.66%).

## DISCUSSION

In the present study, we assessed the prevalence of thyroid disorders, particularly hypothyroidism, in population residing Bhopal. Hypothyroidism was found to be a common form of thyroid dysfunction affecting 9.33% of the study population. The prevalence of undetected hypothyroidism was 3.67%. This suggests that a significant proportion of patient population may go undetected and untreated even as it continues to impair the daily quality of life,

work performance and economic productivity of an individual.

On the other hand, among the subjects who self-reported themselves to be hypothyroid, a significant proportion (28%) still had a high TSH value. This calls for a review of current practices in the management of thyroid disorders, including active screening of endocrine function among patients at greater risks and an emphasis on regular monitoring of the thyroid status and dose adjustments to provide effective therapy in those with established diagnosis.

In general, India is now considered to be in the post-iodization phase. [17] Our results suggest that, nationwide, the prevalence of hypothyroidism in adults is very high in this era. Unfortunately, no prevalence data exist on the occurrence of hypothyroidism among adults in the pre-iodization phase. The slight, but statistically signify cant increased prevalence of hypothyroidism among the inland vs. coastal cities in our study leads us to speculate whether iodine deficiency may continue to play a role in hypothyroidism in India.

The emergence of Kolkata as the worst affected city was unanticipated, particularly as the city was established to be iodine replete over a decade back. [25] However, in a comparable geographical area of Gangetic basin in West Bengal, the prevalence of hypothyroidism in 3814 subjects from all age groups was even higher (29%). [26] The high prevalence figures in Kolkata have ascertained that thyroid disorders in India are not confined to the conventional iodine-deficient sub-Himalayan zone but also extended to the plain fertile lands. A possible etiological role of cyanogenic foods acting as goitrogens to interfere with iodine nutrition has been previously suggested for, but not limited to this area. [27,28]

To summarize the present study is to first provide nationwide data on the prevalence of hypothyroidism in the adult population. The study shows a high prevalence of hypothyroidism and positivity to anti-TPO antibodies. This poses a public health concern and an important challenge to the policy makers and health professionals.

## CONCLUSIONS

Hypothyroidism is a commonly prevailing disorder in adult Indian population. Older overweight females seem to be more prone. Autoimmune mechanisms appear to play an etiological role in a significant proportion of patients. Identification of multiple risk factors and plausible underlying mechanisms is warranted.

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