

Original article

Prevalence of hypothyroidism in Kolkata: An epidemiological pilot study

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Abstract

Context: Hypothyroidism is believed to be a common health problem in India but there is a paucity of data on its prevalence in the country.

Objective: A pilot study to estimate the prevalence of hypothyroidism (subclinical & overt) in Kolkata and its associated epidemiological factors.

Methods: 148 voluntary participants (students, parents, and teachers of a girls' school in central Kolkata) were screened for serum TSH & FT4 and clinically examined for the presence of goitre.

Results: 14% (21 cases) of participants were known hypothyroid on treatment. 17.5% (26 cases) of participants were newly diagnosed with hypothyroidism (6 with overt and 20 with subclinical hypothyroidism) and 5% (8 cases) of them had a TSH > 10 mIU/L. Among known hypothyroid individuals, 38% (8 patients) had a family history of thyroid disease while it was present in only 7.7% (2 patients) of newly diagnosed hypothyroid patients. 42% (9 patients) of known hypothyroid individuals and only 7.7% (2 patients) of newly diagnosed hypothyroid individuals had a goitre. The overall prevalence of hypothyroidism in the study population was 31.75% and the overall prevalence of goitre was 22.3% (33 individuals). A significant number of patients (17.5%) were detected to have hypothyroidism for the first time which could be due to absence of associated goitre and family history in them.

Conclusion: The prevalence of hypothyroidism is very high, affecting approximately 3 in 10 individuals in the study population of Kolkata and more than half of them were previously undetected.

Key words: Hypothyroidism, Subclinical hypothyroidism, Goitre.

Introduction:

An estimated 42 million Indians are suffering from thyroid disorders.[1] Hypothyroidism is the commonest thyroid disorder in India, affecting one in ten adults. A recent study conducted in eight cities of India revealed that the prevalence of hypothyroidism in the overall study population was 10.95% of which 3.47% were previously undetected and 7.48% were self-reported cases. Among all the cities, Kolkata recorded the highest prevalence of hypothyroidism (21.67%). [2] Thyroid hormone

insufficiency most commonly presents with isolated elevation of serum thyrotropin (TSH) level in the setting of normal serum thyroid hormone with or without accompanying symptoms, and is known as subclinical hypothyroidism (SCH). The incidence of SCH increases with advanced age, [3] female gender, [4] and greater dietary iodine intake. [5]

Aims and Objectives:

Hypothyroidism is believed to be a common health problem in India but there is a paucity of data on its prevalence in the country. The present pilot study is

an attempt to estimate the prevalence of hypothyroidism (overt and subclinical) in Kolkata and look at its associated epidemiological factors.

Materials and methods:

Study design and enrollment criteria

This was a cross-sectional study conducted at a girls' school of Kolkata as part of a thyroid awareness camp. Primary outcome variable of the study was the prevalence of hypothyroidism assessed by measurement of thyroid hormones. Secondary outcome measures were the prevalence of: i) known and undetected hypothyroidism, ii) sub-clinical hypothyroidism (SCH) and iii) association with age, goitre, and family history of thyroid disease. Students, their guardians, school teachers and staff were invited to participate and those willing to provide a blood sample for laboratory investigation were included in the study. Participants were excluded if they were pregnant, or had any acute or chronic systemic illness; or if they were receiving medicines (except levothyroxine sodium) that could interfere with thyroid function tests. The study was approved by the Ethics Committee of Nilratan Sircar Medical College and Hospital, Kolkata and carried out in accordance with the approved protocol and principles of Declaration of Helsinki and Good Clinical Practice. All participants were required to provide written informed consent before study entry.

Subjects

Enrolment of 150 participants was planned to form a target population. For creating awareness about the camp, invitation leaflets were distributed, banners were exhibited at appropriate areas and 8-10 posters were displayed in the vicinity of the camp and all teachers, employees, students and their guardians were informed about the camp.

Study procedure

Participants were evaluated by a detailed history and clinical examination for evaluation of thyroid disease and data entered into a proforma designed for the same, as well as with laboratory investigations. Goitre staging was done based on the WHO goitre staging into 4 stages (0-III). A certified laboratory performed serum free thyroxine (FT4) and TSH assay by chemiluminescence using Advia Centaur automated immunoassay analyzer.

Based on their history of known thyroid disease and current thyroid function test results, participants were classified using the following definitions: **Overt Hypothyroid:** Serum FT4 <0.80 ng/dL and TSH > 4.70 mIU/L, **Subclinical hypothyroidism:** Normal serum FT4 (0.8-1.8 ng/dL) and TSH > 4.70 μ IU/mL. **Self-reported hypothyroidism:** Subjects with history of hypothyroidism and taking levothyroxine therapy. **Undetected Hypothyroidism:** Subjects without history of hypothyroidism and detected to have hypothyroidism through thyroid function tests.

Statistical analysis

Statistical analysis was performed using SPSS statistical software (version 19.0). The analysis was performed on the set of all eligible subjects enrolled in the study according to the study protocol. The prevalence of hypothyroidism and other thyroid disorders was summarized as counts and percentages. A Chi-square test was used to assess the trends in the prevalence of hypothyroidism, among different age groups and gender categories.

Observations and Results:

One hundred and fifty two (152) participants were initially enrolled but out of them four participants were excluded as they refused to provide a blood sample. Out of the 148 analysable subjects, majority

were female 129 (87%), including 23 (16%) students [Figure 1]. The mean age of the study subjects was 35.85 years and ranged from 5 to 75 years in the overall study population. The majority of the population (80%) was between 20 to 59 years of age [Figure 2]. Some important findings are:

- Overall prevalence of hypothyroidism was 31.7% (47/148)
- Prevalence of newly diagnosed hypothyroidism was 17.5% (26/148)
- Prevalence of known thyroid disease was 14.2% (21/148)
- Hypothyroidism was most prevalent in the 30 to 50 years age group at 39.8% (33/83). [Figure-3]
- Overall prevalence of goitre was 22.3% (33 patients) and most common goitre staging (15%) was Ia. [Figure 4]
- Prevalence of goitre in those with known thyroid disease was 42.8% (9 out of 21 patients) while only 2 patients out of 26 newly detected cases (7.7%) of hypothyroidism had goitre.
- Positive family history of hypothyroidism was present in 21.4% of study population.
- In known cases of hypothyroidism, 38% (8 out of 21) patients had a positive family history while only 7.7% (2 out of 26) of newly detected cases gave a positive family history for thyroid disease.[Table-1] These results depict that in the newly detected cases, presence of goitre and family history of thyroid disease were significantly lower in comparison to known hypothyroid patients.
- New cases (all females) with overt hypothyroidism was 4% (6/148) [Table-2]

- New cases with subclinical hypothyroidism was 13.51% (20/148)
- Total of 33 individuals had clinically palpable goitre and out of them, 26 were biochemically euthyroid

Discussion:

In the present pilot study, we estimated the prevalence of hypothyroidism in Kolkata and it was found to affect 31.7% of the study population. The prevalence of undetected hypothyroidism was 17.5% which meant that more than half of the hypothyroid patients in our population (26 out of 47) were diagnosed for the first time. This suggests that a significant proportion of patient population may go undetected and untreated in Kolkata. In a comparable geographical area of the Gangetic basin in West Bengal, the prevalence of hypothyroidism in 3814 subjects from all age groups was also reported to be high (29%) in an earlier study.[6] Similarly, according to a recent multi-centric prevalence study, Kolkata recorded the highest prevalence of hypothyroidism (21.67%) among 8 cities of India.[2] The high prevalence figures in Kolkata means that thyroid disorders in India are not limited to the conventional iodine-deficient sub-Himalayan zone but also extend 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 this but is not limited to this area.[7, 8]

The prevalence of hypothyroidism was highest in the 30-50 year age group at 39.8% and showed a rising trend with age. This age-wise increase in prevalence of hypothyroidism is probably due to thyroid autoimmunity, which is known to increase with age as reported in the Whickham survey.[9] Besides, prevalence of hypothyroidism was more in females

and increased with age, which is similar to that observed by Parle et al.[10]

A significant number of patients (17.5%) in our study population were detected to have hypothyroidism for the first time, of which subclinical hypothyroidism was 77% while 23% of newly diagnosed patients had overt hypothyroidism. The reason behind such a large number of patients staying undiagnosed could be due to it not being associated with goitre and/or a positive family history of thyroid disease.

Conclusion:

Hypothyroidism is a commonly prevailing disorder in Kolkata. The prevalence of hypothyroidism was high in our study, affecting approximately 3 out of 10 individuals in the study population with more than half of these cases being previously undetected. Screening for SCH needs to be routinely considered in Indian women after the age of 30 years in view of its high prevalence as seen in our study population.

References:

1. Vahab Fatourehchi, Subclinical Hypothyroidism: An Update for Primary Care Physician Mayo Clin Proc. 2009; 84(1):65-71.
2. Ambika Gopalakrishnan Unnikrishnan, Sanjay Kalra, Rakesh Kumar Sahay, Ganapathi Bantwal, Mathew John, and Neeraj Tewari. Prevalence of hypothyroidism in adults: An epidemiological study in eight cities of India. Indian J Endocrinol Metab. 2013 Jul-Aug; 17(4): 647–652.
3. Geul KW, van Sluisveld IL, Grobbee DE, Docter R, de Bruyn AM, Hooykaas H, et al. The importance of thyroid microsomal antibodies in development of elevated serum TSH in middle age women; Association with serum lipids. Clin Endocrinol (Oxf) 1993;39:275-80.
4. Vanderpump MP, Tunbridge WM, French JM, Appleton D, Bates D, Clark F, et al. The incidence of thyroid disorders in community. A 20 year follow up of the Wickham survey. Clin Endocrinol 1995;43:55-68.
5. Szavolcs I, Podoba J, Feldkamp J, Dohan O, Farkas I, Sajgó M, et al. Comparative screening for thyroid disorders in old age in areas of iodine deficiency, long term iodine deficiency, long term iodine prophylaxis and abundant iodine intake. Clin Endocrinol (Oxf) 1997;47:87-92.
6. Chandra AK, Tripathy S, Mukhopadhyay S, Lahari D. Studies on endemic goitre and associated iodine deficiency disorders (IDD) in a rural area of the Gangetic West Bengal. Indian J Nutr Diet. 2003;40:53–8.
7. Chandra AK, Tripathy S, Lahari D, Mukhopadhyay S. Iodine nutritional status of school children in a rural area of Howrah district in the Gangetic West Bengal. Indian J Physiol Pharmacol. 2004;48:219–24.
8. Chandra AK, Mukhopadhyay S, Lahari D, Tripathy S. Goitrogenic content of Indian cyanogenic plant foods and their in vitro anti-thyroidal activity. Indian J Med Res. 2004;119:180–5.
9. Tunbridge WM, Evered DC, Hall R, Appleton D, Brewis M, Clark F, et al. The spectrum of thyroid disease in a community. The Wickham survey. Clin Endocrinol (Oxf) 1977;7:481-93.
10. Bell GM, Todd WT, Forfar GC, Martyn C, Wathen CG, Gow S, et al. End organ responses to thyroxine therapy in Subclinical Hypothyroidism. Clin Endocrinol (Oxf) 1985;22:83-9.