Original Article

Prevalence of Subclinical Hypothyroidism in First-Trimester Pregnancy: A Cross-Sectional Study at a Tertiary Care Hospital in West Bengal

Arindam Samanta[1], Anjana Baitalik[2], Abu Rihan Md Wasim Jakir Biswas[3], Amitabha Das[4]

[1]Tutor, Department of Biochemistry, AIIMS, Kalyani, West Bengal, India.
[2]Associate Professor, Department of Anatomy, College of Medicine & J.N.M. Hospital, Nadia, West Bengal, India.
[3]Demonstrator, Department of Biochemistry, College of Medicine & J.N.M. Hospital, Nadia, West Bengal, India.
[4]Professor, Department of Biochemistry, College of Medicine & J.N.M. Hospital, Nadia, West Bengal, India.

Abstract

Background: Thyroid dysfunction is one of the most frequent endocrine abnormalities that may occur during pregnancy, and has important implications for both maternal and foetal outcomes. Subclinical hypothyroidism (SCH) — This is when someone has an elevated thyroid-stimulating immunoglobulin (TSH) level, but the serum level of free thyroxine (FT4) is normal, and it is often not detected unless biochemical screening is carried out regularly. It is especially important to identify early (first trimester) due to the high sensitivity of fetal neurodevelopment to maternal thyroid hormone status early in gestation. The aim is to determine the prevalence of subclinical hypothyroidism among adult first-trimester pregnant women attending a tertiary care hospital in West Bengal. **Material and Methods:** A hospital-based cross-sectional study was conducted among first-trimester antenatal women (8–12 weeks of gestation) attending a tertiary care hospital in West Bengal. Thyroid function was assessed using serum FT4 and TSH estimation. Pregnant women aged below 18 years were excluded. A total of 282 pregnant women were included in this study. Subclinical hypothyroidism was defined as elevated serum TSH (>2.5 µIU/mL) with normal FT4 levels. **Results:** The mean age of participants was 24.25 ± 4.38 years. The mean serum FT4 level was 1.09 ± 0.24 ng/dL, while the mean serum TSH level was 3.38 ± 5.81 µIU/mL. Most participants belonged to the 21–25 years age group (43.6%). Subclinical hypothyroidism was identified in 88 participants, yielding a prevalence of 31.2%.. **Conclusion:** A considerable proportion of first-trimester pregnant women demonstrated subclinical hypothyroidism. These findings support the importance of routine thyroid function screening during early pregnancy for timely diagnosis and management.

Keywords: Subclinical hypothyroidism, pregnancy, first trimester, thyroid-stimulating hormone, free thyroxine, antenatal screening, West Bengal.

Received: 02 May 2026 **Revised: 19 May 2026** **Accepted: 12 June 2026** **Published: 15 June 2026**

Introduction

Hormonal, metabolic and immunological changes are significant during pregnancy due to adaptations necessary for normal fetal growth and development, which result in changes in thyroid function.[1] During pregnancy, the high levels of estrogen are responsible for high levels of thyroxine-binding globulin, hence changing the thyroid hormone level of the blood; human chorionic gonadotropin (hCG) also has thyrotropic effects, causing a temporary drop in serum thyroid-stimulating hormone (TSH) concentration, especially at the start of pregnancy.[2,3] These dynamic physiological changes make trimester specific reference intervals vital to accurate interpretation of thyroid function tests in pregnancy.[4]

Maternal thyroid hormones are important during embryogenesis, development of the placenta and maturation of fetal neurological system, particularly in the first trimester of pregnancy, when the fetal thyroid gland is structurally and functionally immature.[5] In this time, the growing baby is almost entirely reliant on maternal thyroxine for normal brain development and metabolic control.[6] Any maternal thyroid abnormality, even slight ones, can have a negative impact on the pregnancy and fetal development.[7]

Subclinical hypothyroidism (SCH) is defined biochemically as having elevated serum TSH, but normal circulating free thyroxine (FT4).[8] In contrast to overt hypothyroidism, SCH may be entirely asymptomatic or have nonspecific clinical features, and may only be diagnosed by chance, if routine biochemical screening is not undertaken.[9]

There is a wide variation of reported prevalence of SCH among populations, based on ethnicity, iodine nutritional status, socioeconomic status, laboratory methodology, and thresholds employed for diagnosis of thyroid dysfunction.[10] The prevalence rate of the condition has been reported to be from about 2% to over 30% in different countries with comparatively high prevalence rates often reported in South Asian

Address for correspondence: Arindam Samanta,
Tutor, Department of Biochemistry, AIIMS, Kalyani, West Bengal, India.
E-mail: arindambiochem851@gmail.com

DOI:
10.21276/amit.2026.v13.i2.744

How to cite this article: Samanta A, Baitalik A, Biswas MWJ, Das A. Prevalence of Subclinical Hypothyroidism in First-Trimester Pregnancy: A Cross-Sectional Study at a Tertiary Care Hospital in West Bengal. Acta Med Int. 2026;13(2):669-672.

populations.[11,12]

There are a variety of maternal and fetal complications that have been associated with untreated maternal SCH, such as miscarriage, gestational hypertension, placental abruption, anemia, preterm delivery, fetal growth restriction, low birth weight, and impaired neurocognitive development in the fetus.[7,13,14] Early diagnosis and treatment of thyroid dysfunction is very clinically important as many of these complications may be prevented.[15]

There is continuing debate about whether to screen all pregnant women. Some professional guidelines state that targeted screening should be performed for women who have clinical risk factors, but a number of studies have shown that this case finding approach can miss a significant number of women who are asymptomatic and have thyroid dysfunction.[16] Therefore, universal biochemical screening can offer considerable clinical benefit in population with a relatively high prevalence of thyroid disorders.

Information on the prevalence of thyroid dysfunction in antenatal women in eastern India, especially in West Bengal is limited. The potential maternal and foetal outcomes of undiagnosed thyroid disease indicate the need to assess the burden of disease at the local level to inform screening policies and clinical management strategies.

Hence, the present study was conducted to find out the prevalence of subclinical hypothyroidism in the first trimester pregnant women who came to a tertiary care hospital in the West Bengal.

Materials and Methods

Study Design and setting: The current study was a cross-sectional, observational study in the hospital setting in a tertiary-level teaching hospital in West Bengal, India. The study aimed to establish the prevalence of subclinical hypothyroidism in pregnant women who attended for their regular ante natal checkup in early pregnancy. As it serves as a major tertiary referral centre for the obstetric population that is varied, it was a suitable context to assess thyroid dysfunction in the antenatal women.

Study Population: The study population consisted of pregnant women who attended the antenatal outpatient department, during the first trimester of pregnancy (8-12 weeks of gestation). This window of gestation was chosen because maternal thyroid hormone is especially important for fetal growth and neurodevelopment prior to the onset of fetal thyroid function.

Inclusion criteria

Participants were considered eligible for inclusion if they fulfilled the following criteria:

1. Pregnant women in the first trimester of pregnancy (8–12 weeks gestation)
2. Maternal age 18 years or above
3. Attendance at routine antenatal outpatient services during the study period
4. Availability of thyroid function assessment data, including serum TSH and FT4 estimation

Eligibility criteria:

Participants were excluded from the study under the following circumstances:

1. Maternal age below 18 years
2. Previously diagnosed thyroid disease
3. Current or prior use of thyroid hormone replacement therapy or antithyroid medication
4. Incomplete demographic, clinical, or biochemical records
5. Presence of insufficient laboratory data for thyroid function interpretation

Sample size and sampling strategy: A total of 282 first-trimester antenatal women were enrolled in the study using a consecutive sampling strategy, wherein all eligible participants presenting during the study period were included until the predetermined sample size was achieved. This sampling approach minimized selection bias and ensured representation of the routine antenatal population attending the tertiary care institution.

Data collection: A structured data collection proforma was used to collect clinical and demographic data at her antenatal evaluation. The participant information that was relevant to the study included maternal age, gestational age, and thyroid biochemical parameters. Before being used in the final analysis all the data were checked for completeness and accuracy.

Laboratory assessment: All study subjects had venous blood samples taken during the normal delivery check-up under sterile conditions. Biochemical parameters, namely serum thyroid hormone (TSH) and free thyroxine (FT4) levels were estimated according to the standardized biochemical procedure followed in the institutional laboratory. Routine biochemical evaluation of thyroid function was done in a controlled laboratory setting.

Operational definition of subclinical hypothyroidism

Subclinical hypothyroidism was defined using first-trimester biochemical diagnostic criteria as:

- Serum TSH concentration >2.5 µIU/mL
- Normal serum FT4 concentration within the reference range

Participants fulfilling these criteria were classified as cases of subclinical hypothyroidism, whereas those with thyroid function parameters within normal limits were categorized as euthyroid.

Statistical analysis: Collected data were entered into a structured database and subjected to statistical analysis using descriptive statistical methods. Continuous variables were expressed as mean ± standard deviation (SD) to summarize central tendency and dispersion. Categorical variables were presented as frequencies and percentages. The prevalence of subclinical hypothyroidism was calculated as the proportion of participants meeting the predefined diagnostic criteria relative to the total study population included in the analysis.

Ethical considerations: The study was carried out in an ethical manner in compliance with the ethical standards for biomedical research with human subjects. Ethical approval for the study was granted by the relevant ethics review committee in the institution before the study began. The study's process was conducted with respect for participant confidentiality and data privacy, with all data collected being anonymous in nature and having been anonymized before being analyzed.

Results

Most study participants belonged to the 21–25 years age group (43.6%), followed by the 26–30 years age group (23.4%). [Table 1]

Table 1: Age Distribution of Study Participants

Age Group (Years)	Frequency (n)	Percentage (%)
18–20	63	22.3
21–25	123	43.6
26–30	66	23.4
31–35	28	9.9
≥36	2	0.7
Total	282	100

The mean age of participants was 24.25 years, while the mean thyroid biochemical parameters indicated normal average FT4 with variable TSH distribution. [Table 2]

Table 2: Descriptive Statistics of Study Variables

Parameter	Mean ± SD
Age (years)	24.25 ± 4.38
FT4 (ng/dL)	1.09 ± 0.24
TSH (µIU/mL)	3.38 ± 5.81

Subclinical hypothyroidism was identified in 88 participants, giving an overall prevalence of 31.2%. [Table 3]

Table 3: Prevalence of Subclinical Hypothyroidism

Thyroid Status	Frequency (n)	Percentage (%)
Subclinical Hypothyroidism	88	31.2
Euthyroid	194	68.8
Total	282	100

Discussion

Thyroid dysfunction in pregnancy is a major endocrine condition that has a major impact on the health of the mother and the foetus. Thyroid hormones are required for normal fetal brain development, placental maturation and maintenance of metabolic homeostasis during pregnancy, especially during the first trimester of gestation, when fetal thyroid hormone production is quite immature and fetal needs for thyroid hormone are almost entirely supplied by maternal thyroid. Physiological changes in thyroid hormone metabolism during pregnancy are important enough to warrant early evaluation of thyroid status, as stated by Glinoer.[1] Similarly, Alexander et al,[2] highlighted the importance of trimester-specific assessment of thyroid function for appropriate diagnosis and management.

In the present study, the prevalence of subclinical hypothyroidism (SCH) among first-trimester pregnant women was found to be 31.2%, indicating a substantial burden of thyroid dysfunction in the study population. This prevalence is considerably higher than reports from many international studies. Stagnaro-Green et al,[3] reported that SCH prevalence during pregnancy generally ranges between 2% and 10% in Western populations. Likewise, Lazarus,[4] described lower prevalence rates in iodine-sufficient populations, suggesting that demographic and regional factors significantly influence disease occurrence.

The comparatively higher prevalence observed in the present study is more consistent with findings from Indian studies. Dhanwal et al,[5] in a North Indian study, reported a prevalence of 14.3% of subclinical hypothyroidism during the first trimester. Sahu et al,[6] observed thyroid dysfunction in 12.7% of pregnant women, with SCH being the predominant abnormality. Marwaha et al,[7] also reported a high prevalence of thyroid dysfunction among Indian antenatal women and stressed the need for trimester-specific population-based reference values. The higher prevalence in the present study may be explained by regional iodine nutritional differences, environmental influences, population characteristics, and the use of a lower diagnostic threshold of TSH >2.5 µIU/mL.

The age of the participants in the present study was 24.25 ± 4.38 years, and most of the women were in the age range of 21–25 year. The age distribution is in line with the results of the thyroid screening studies in the antenatal population conducted by Sahu et al,[6] and Rao et al,[8] which showed that women in the younger reproductive age group were the main participants in the studies. This is the typical obstetric age distribution in tertiary care.

In the present study, the mean serum FT4 level was 1.09 ± 0.24 ng/dL suggesting that peripheral thyroid hormones levels were preserved despite high TSH level in SCH cases. This biochemical pattern meets the criteria for subclinical hypothyroidism. De Groot et al,[9] defined SCH as a state of early thyroid dysfunction with high TSH levels but normal serum T4 and T3 levels, because of the compensatory stimulation of the pituitary gland. In addition, pregnancy-related hormonal changes such as the rise in thyroxine-binding globulin and in the thyrotropic activity of human chorionic gonadotropin (hCG) might affect thyroid biochemical parameters, as Goodwin,[10] has explained.

In the present study, the mean serum TSH level was 3.38 ± 5.81 µIU/mL, indicating a wide range of variations among the participants. Wang et al,[11] also found biochemical

heterogeneity as they reported that although thyroid dysfunctions are common and often asymptomatic, they can only be diagnosed by biochemical screening.

In this study, the prevalence of SCH was high, justifying the idea of screening all pregnant women for thyroid disease. The use of selective risk-based screening may miss many women with breast cancer. Vaidya et al,[12] reported that up to 29.8% of those who are thyroid affected during pregnancy may be undetected if screening is not targeted. Likewise, Horacek et al,[13] showed that universal screening identified substantially more thyroid disorders than did case-finding screening. Considering the relative prevalence demonstrated in the current study, universal antenatal screening may have a clinical value.

There is links between untreated SCH and poor maternal and fetal outcomes. Casey et al,[14] reported strong relationships between obstetric complications (such as preterm delivery and placental complications) and maternal hypothyroidism. Negro et al,[15] showed that prompt diagnosis and treatment of thyroid dysfunction may help to prevent pregnancy complications. Moreover, Haddow et al,[16] found that maternal thyroid hormone deficiency was linked to poor neurodevelopmental outcomes in children, again highlighting the need to detect thyroid hormone deficiency at an early age.

The prevalence of SCH in the present study highlights that SCH could be an underestimated public health problem in antenatal women in West Bengal. Therefore, it seems logical that regularly screening the thyroid during the first trimester could help to identify the thyroid disorders early and provide early intervention, which may help improve pregnancy outcomes.

But some of the drawbacks must be noted. The study was conducted in one hospital and is a cross sectional study, which makes it difficult to interpret the results in relation to other populations. Autoimmune thyroid disease was not diagnosed due to lack of thyroid autoantibody testing. Also, there were no trimester-specific reference intervals to use for each population, which could have affected prevalence estimates.

Even in the face of these restrictions, in the present study, the authors have provided valuable regional data on the impact of subclinical hypothyroidism in early pregnancy and advocated for universal antenatal thyroid screening in like populations.

Conclusion

The prevalence of subclinical hypothyroidism was extremely high in first trimester of pregnancy who attended a tertiary care hospital in West Bengal, almost one-third of the study population were found to be affected. Routine screening of thyroid function tests in early pregnancy could lead to early diagnosis and intervention of SCH, and thus improve maternal and fetal outcomes, given the asymptomatic nature of SCH and its potential adverse obstetric consequences.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Glinoer D. The regulation of thyroid function in pregnancy. Endocr Rev. 1997;18(3):404-33.
2. Alexander EK, Pearce EN, Brent GA, Brown RS, Chen H, Dosiou C, et al. 2017 Guidelines of the American Thyroid Association for thyroid disease during pregnancy and postpartum. Thyroid. 2017;27(3):315-89.
3. Stagnaro-Green A, Abalovich M, Alexander E, Azizi F, Mestman J, Negro R, et al. Guidelines for thyroid disease during pregnancy. Thyroid. 2011;21(10):1081-125.
4. Lazarus JH. Thyroid function in pregnancy. Br Med Bull. 2011;97:137-48.
5. Dhanwal DK, Prasad S, Agarwal AK, Dixit V, Banerjee AK. High prevalence of subclinical hypothyroidism during first trimester pregnancy in North India. Indian J Endocrinol Metab. 2013;17(2):281-4.
6. Sahu MT, Das V, Mittal S, Agarwal A, Sahu M. Overt and subclinical thyroid dysfunction among Indian pregnant women. Arch Gynecol Obstet. 2010;281(2):215-20.
7. Marwaha RK, Chopra S, Gopalakrishnan S, Sharma B, Kanwar RS, Sastry A, et al. Establishment of trimester-specific thyroid hormone reference ranges in Indian women. Thyroid. 2008;18(5):499-505.
8. Rao M, Zeng Z, Zhou F, Wang H, Liu J, Wang R, et al. Thyroid dysfunction in pregnancy. BMC Pregnancy Childbirth. 2019;19:251.
9. De Groot L, Abalovich M, Alexander EK, Amino N, Barbour L, Cobin RH, et al. Management of thyroid dysfunction during pregnancy. Thyroid. 2012;22(10):1081-125.
10. Goodwin TM. Thyroid physiology in pregnancy. Endocrinol Metab Clin North Am. 2011;40(4):739-57.
11. Wang W, Teng W, Shan Z, Wang S, Li J, Zhu L, et al. Thyroid disorders and pregnancy outcomes. J Clin Endocrinol Metab. 2011;96(10):E1654-E1662
12. Vaidya B, Anthony S, Bilous M, Shields B, Drury J, Hutchison S, et al. Screening for thyroid dysfunction in pregnancy. BMJ. 2007;335:663.
13. Horacek J, Spitalnikova S, Dlabalova B, Malirova E, Vizda J, Svilias I, et al. Universal screening detects more thyroid disorders in pregnancy. Eur J Endocrinol. 2010;163(4):645-50.
14. Casey BM, Dashe JS, Wells CE, McIntire DD, Byrd W, Leveno KJ, et al. Subclinical hypothyroidism and pregnancy outcomes. Obstet Gynecol. 2005;105(2):239-45.
15. Negro R, Stagnaro-Green A. Diagnosis and management of subclinical hypothyroidism in pregnancy. BMJ. 2014;349:g4929.
16. Haddow JE, Craig WY, Neveux LM, Palomaki GE. Thyroid function and fetal brain development. Best Pract Res Clin Endocrinol Metab. 2011;25(6):927-35.