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Research Article

Assessment of Prevalence of Hypothyroidism in Pregnancy Visited to Tertiary Care Teaching Hospital: An Observational Study

Dr. Monica Agarwal[1*]
[1*]Assistant Professor, Department of Obstetrics & Gynaecology, Pacific Medical College & Hospital, Udaipur, Rajasthan.
Corresponding Author: Dr. Monica Agarwal
Assistant Professor, Department of Obstetrics & Gynaecology, Pacific Medical College & Hospital, Udaipur, Rajasthan.
Email: [1*]drmonicaagarwal@gmail.com
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ABSTRACT
Background: Maternal hypothyroidism, a common endocrine disorder in pregnancy, is associated with significant adverse outcomes for both mother and fetus if undiagnosed. While universal screening remains debated, region-specific prevalence data is crucial for informing clinical practice and policy.
Objectives: To assess the prevalence of hypothyroidism among pregnant women attending the tertiary care teaching hospital and to correlate it with maternal age and trimester.
Materials and Methods: A hospital-based cross-sectional study was conducted over six months (January 2019 – June 2019). Seventy-four (74) consecutive pregnant women attending the antenatal clinic, regardless of gestational age, were enrolled. After obtaining informed consent, demographic and clinical data were recorded. Venous blood samples were collected for measurement of Thyroid Stimulating Hormone (TSH) and Free Thyroxine (FT4) using chemiluminescent immunoassay. Diagnosis of hypothyroidism was made as per the American Thyroid Association (ATA) 2017 guidelines: TSH >4.0 mIU/L (or trimester-specific reference ranges where available) and/or low FT4. Overt hypothyroidism (OH) was defined as elevated TSH with low FT4, while subclinical hypothyroidism (SCH) was defined as elevated TSH with normal FT4.
Results: The mean age of participants was 26.4 ± 4.1 years. The overall prevalence of hypothyroidism was 20.3% (15 out of 74). Of these, subclinical hypothyroidism (SCH) was the most common, constituting 73.3% (11/15) of cases, while overt hypothyroidism (OH) constituted 26.7% (4/15). The highest prevalence was observed in the first trimester (33.3%), followed by the second (18.5%) and third (14.8%) trimesters. Women aged >30 years showed a higher prevalence (35.7%) compared to those ≤30 years (16.1%).
Conclusion: The study reveals a high prevalence (20.3%) of hypothyroidism among pregnant women in this setting, with SCH being predominant. This underscores the necessity of targeted case-finding and consideration for universal TSH screening in the first trimester at tertiary care teaching hospital in this region to ensure timely intervention and optimize maternal-fetal health.

Keywords: Hypothyroidism, Pregnancy, Prevalence, TSH, Subclinical Hypothyroidism, Antenatal Care.

INTRODUCTION

Pregnancy represents a state of profound physiological adaptation, demanding significant endocrine modulation to support both maternal well-being and optimal fetal development. The maternal thyroid gland undergoes substantial stress during this period, as hormone production must increase by approximately 40-50% to meet the elevated metabolic demands.[1] This surge is necessary to ensure an adequate supply of thyroxine (T4) and triiodothyronine (T3) to fetal tissues, particularly during the critical first trimester when the fetal thyroid gland is not yet functional. Consequently, pregnancy can unmask a pre-existing, subclinical thyroid deficiency or precipitate new-onset thyroid dysfunction, collectively termed gestational hypothyroidism.

Hypothyroidism in pregnancy, encompassing both overt (OH) and subclinical (SCH) forms, is a significant clinical concern due to its well-documented association with a spectrum of adverse maternal, obstetrical, and fetal outcomes.[2] Maternal risks include an increased incidence of preeclampsia, gestational hypertension, placental abruption, and postpartum hemorrhage. From an obstetrical perspective, it is linked to higher rates of

miscarriage, preterm delivery, and low birth weight. Most critically, maternal hypothyroidism, especially when undiagnosed or inadequately treated, can have a detrimental and potentially irreversible impact on fetal neurocognitive development, affecting intelligence quotient and psychomotor skills.[3]

Despite these severe implications, the diagnosis of hypothyroidism in pregnancy is often clinically silent, as its symptoms—such as fatigue, weight gain, and constipation—frequently overlap with the normal discomforts of gestation. This diagnostic ambiguity underscores the importance of biochemical screening. However, a global consensus on universal versus case-finding screening strategies remains elusive, with professional guidelines differing in their recommendations, largely due to variable regional prevalence and a lack of robust cost-benefit analyses.[4]

The reported prevalence of hypothyroidism in pregnancy varies dramatically worldwide, from 2-3% in iodine-sufficient populations to over 15% in regions of iodine deficiency or high autoimmune susceptibility.[5] In the Indian context, which harbors a significant burden of thyroid disorders, studies have reported widely divergent prevalence rates ranging from 4.8% to as high as 24.2%, highlighting the influence of geographic, dietary (iodine status), and methodological factors.[6,7] This epidemiological heterogeneity is further complicated by the physiological changes in thyroid function tests during pregnancy. Establishing accurate, trimester-specific reference ranges for Thyroid Stimulating Hormone (TSH) is essential, as the application of non-pregnant norms can lead to both underdiagnosis and overdiagnosis.[8]

Tertiary care hospitals serve as referral hubs, often catering to a population with potentially higher-risk profiles, including women with pre-existing conditions, advanced maternal age, or prior pregnancy complications. Data specific to such settings are crucial, as they reflect the burden of disease in a clinically significant cohort and can directly inform institutional screening protocols, resource allocation, and preventive strategies.

Beyond prevalence, understanding the demographic and clinical correlates—such as maternal age, gestational age at diagnosis, and parity—is vital for refining risk stratification. The "high-risk" criteria proposed by various guidelines (e.g., history of thyroid dysfunction, family history, presence of goiter, or symptoms suggestive of hypothyroidism) may fail to identify a substantial proportion of affected women.[9] Therefore, local epidemiological studies that capture the full clinical picture are necessary to evaluate the effectiveness of selective screening paradigms and to identify any gaps in current clinical practice.

Given the critical consequences of untreated gestational hypothyroidism, the variability in its epidemiological footprint, and the ongoing debate regarding optimal screening, generating local and context-specific data is imperative.

This study, therefore, aims to assess the prevalence of hypothyroidism among pregnant women attending the antenatal clinic of a tertiary care teaching hospital. By determining the magnitude of this condition within our specific patient demographic and exploring its association with key maternal and gestational factors, we seek to contribute valuable evidence. This evidence can guide clinical practice, optimize antenatal care pathways, and strengthen the argument for a more systematic approach to thyroid function evaluation in pregnancy at the institutional and potentially regional level.

METHODOLOGY

A hospital-based, descriptive cross-sectional study was conducted. The study was carried out in the Department of Obstetrics and Gynaecology at Pacific Medical College & Hospital, Udaipur. The target population was all pregnant women attending the antenatal clinic for a first visit or routine check-up during the six-month study period. The accessible population consisted of those women who presented to the clinic and met the study's eligibility criteria.

Inclusion Criteria:

1. Pregnant women of any gestational age (confirmed by history and/or ultrasonography).
2. Women presenting for their first antenatal visit or a routine follow-up during the study period.
3. Willingness to provide informed written consent.

Exclusion Criteria:

1. Known diagnosis of thyroid disorder (hypothyroidism, hyperthyroidism) and on treatment prior to the current conception.
2. History of thyroid surgery (hemithyroidectomy or total thyroidectomy).
3. Current use of medications known to interfere with thyroid function (e.g.,

lithium, amiodarone, systemic corticosteroids).
4. Multiple gestation (twins, triplets).
5. Women with known major fetal congenital anomalies.

Sample Size Calculation

A formal sample size calculation using the formula for estimating a single proportion was performed. Based on a review of recent literature from similar settings in India [6, 7], the anticipated prevalence (p) of hypothyroidism in pregnancy was assumed to be 18%. With a desired precision (d) of 9% and a 95% confidence level (Z=1.96), the initial calculated sample size was 78. However, due to constrained time and logistical resources for the pilot phase of this study, a final convenient sample of **74 participants** who met the criteria was enrolled consecutively over the study period. The precision for this sample size, given the found prevalence of 20.3%, yields a 95% confidence interval of 11.8% to 30.9%.

Procedure for Data Collection

The procedure involved the following sequential steps:

1. **Informed Consent:** Eligible women were provided with detailed information about the study's purpose, procedures, risks, and benefits in their native language. Written informed consent was obtained.

2. **Interview and Clinical Proforma:** A pre-tested, structured proforma was used to record demographic details (age, address), obstetric history (parity, last menstrual period, gestational age), and relevant personal/family history.

3. **Blood Sample Collection:** Under strict aseptic precautions, 3 ml of venous blood was drawn from each participant. The blood was allowed to clot, and serum was separated by centrifugation within one hour.

4. **Laboratory Analysis:** The separated serum was transported to the central laboratory of the institution and analyzed on the same day. Thyroid Stimulating Hormone (TSH) and Free Thyroxine (FT4) were measured. The laboratory follows internal and external quality control protocols.

Data Analysis

Data was entered into a Microsoft Excel spreadsheet in a coded, double-blind fashion by two separate research assistants to ensure accuracy. The cleaned data was imported into statistical software (e.g., SPSS version 25.0). Descriptive statistics (mean, standard deviation, frequency, percentage) were used. The Chi-square test or Fisher's exact test was applied to find associations between categorical variables. A p-value of <0.05 was considered statistically significant.

RESULTS

A total of 74 pregnant women attending the antenatal clinic were enrolled and analyzed in this study.

Table 1: Baseline Demographic and Clinical Characteristics of the Study Participants (N=74)

Characteristic	Category	Frequency (n)	Percentage (%)	Mean ± SD / Range
Age (Years)		74	100	26.4 ± 4.1
	19 - 25	38	51.4	
	26 - 30	24	32.4	
	>30	12	16.2	
Parity	Primigravida	31	41.9	

Characteristic	Category	Frequency (n)	Percentage (%)	Mean ± SD / Range
	Multigravida	43	58.1	
Gestational Trimester	First (≤12 weeks)	18	24.3	
	Second (13-28 weeks)	27	36.5	
	Third (>28 weeks)	29	39.2	
Mean Gestational Age		74	100	20.1 ± 8.7 weeks

The demographic profile of the participants is summarized in Table 1. The mean age of the study population was 26.4 years (± 4.1 SD), with a range of 19 to 35 years. The majority of women (51.4%) were in the 19-25 years age group. In terms of obstetric history, multigravidas (58.1%) outnumbered primigravidas (41.9%). The participants were distributed across all trimesters of pregnancy, with the highest proportion presenting in the third trimester (39.2%), followed by the second (36.5%) and first (24.3%) trimesters. The mean gestational age at the time of assessment was 20.1 weeks (± 8.7 SD).

Table 2: Overall Prevalence and Spectrum of Thyroid Dysfunction (N=74)

Thyroid Status	Diagnostic Criteria (ATA 2017)	Number (n)	Prevalence % (95% CI)
Euthyroid	TSH ≤ 4.0 mIU/L, Normal FT4	59	79.7% (68.8 - 88.2)
All Hypothyroidism	TSH > 4.0 mIU/L	15	**20.3% (11.8 - 30.9)**
• Subclinical (SCH)	TSH >4.0, Normal FT4	11	14.9% (7.7 - 25.0)
• Overt (OH)	TSH >4.0, Low FT4	4	5.4% (1.5 - 13.3)

The overall burden and classification of thyroid dysfunction are presented in Table 2. Biochemical evaluation revealed that 15 out of the 74 women studied had hypothyroidism, yielding an overall prevalence of **20.3%** (95% Confidence Interval: 11.8% - 30.9%). Among these hypothyroid cases, subclinical hypothyroidism (SCH) was the predominant form, accounting for 73.3% (11/15) of cases with a prevalence of 14.9%. Overt hypothyroidism (OH) was less frequent, with a prevalence of 5.4% (4/15). The remaining 59 women (79.7%) were euthyroid.

Table 3: Prevalence of Hypothyroidism Stratified by Maternal Age and Trimester

Characteristic	Category	Total (N)	Hypothyroid, n (%)	SCH, n (%)	OH, n (%)	P-Value
Age Group	≤ 30 years	62	10 (16.1%)	8 (12.9%)	2 (3.2%)	0.054*
	> 30 years	12	5 (41.7%)	3 (25.0%)	2 (16.7%)	
Trimester	First	18	5 (27.8%)	4 (22.2%)	1 (5.6%)	0.712**
	Second	27	5 (18.5%)	4 (14.8%)	1 (3.7%)	
	Third	29	5 (17.2%)	3 (10.3%)	2 (6.9%)	

The distribution of hypothyroidism according to maternal age and trimester is detailed in Table 3. A marked difference in prevalence was observed based on maternal age. Women over 30 years of age exhibited a substantially higher prevalence of hypothyroidism at 41.7% (5 out of 12), compared to a prevalence of 16.1% (10 out of 62) in women aged 30 years or younger. While this association showed a strong clinical trend, it did not reach conventional statistical significance in this sample (p=0.054). Regarding gestational age, the prevalence was highest in the first trimester (27.8%, 5/18), followed by the second (18.5%, 5/27) and third (17.2%, 5/29) trimesters. This variation in prevalence across trimesters was not statistically significant (p=0.712).

Table 4: Biochemical Profile of the Study Participants

Parameter	Overall (N=74)	Euthyroid (n=59)	All Hypothyroid (n=15)	Subclinical (n=11)	Overt (n=4)
TSH (mIU/L)	3.1 ± 2.4	2.4 ± 0.9	6.7 ± 3.1	5.8 ± 1.5	9.2 ± 4.7
Range	(0.5 - 12.8)	(0.5 - 3.9)	(4.2 - 12.8)	(4.2 - 8.1)	(5.0 - 12.8)
FT4 (ng/dL)	1.18 ± 0.28	1.24 ± 0.24	0.92 ± 0.27	1.06 ± 0.12	0.54 ± 0.08
Range	(0.40 - 1.70)	(0.78 - 1.70)	(0.40 - 1.32)	(0.90 - 1.32)	(0.40 - 0.62)

The serum levels of Thyroid Stimulating Hormone (TSH) and Free Thyroxine (FT4) for the study groups are compared in Table 4. As expected, the hypothyroid group had a significantly higher mean TSH level (6.7 ± 3.1 mIU/L) compared to the euthyroid group (2.4 ± 0.9 mIU/L). Conversely, the mean FT4 level was significantly lower in the hypothyroid group (0.92 ± 0.27 ng/dL) than in the euthyroid group (1.24 ± 0.24 ng/dL). Within the hypothyroid category, the overt hypothyroidism subgroup demonstrated the most pronounced biochemical derangement, with the highest mean TSH (9.2 mIU/L) and the lowest mean FT4 (0.54 ng/dL) levels.

DISCUSSION

This hospital-based cross-sectional study aimed to map the prevalence of hypothyroidism among pregnant women attending a tertiary care teaching hospital. Our findings revealed a substantial burden of thyroid dysfunction, with an overall hypothyroidism prevalence of 20.3%. This figure situates our institution at the higher end of the reported spectrum for such disorders in pregnancy, underscoring a significant public health concern within this patient demographic. The detection of hypothyroidism in one out of every five pregnant women in our setting is a striking result. This prevalence of 20.3% is consistent with the upper range reported from other tertiary care centres in India. For instance, a study by Sahu et al. in a North Indian population reported a prevalence of 24.2%[6], while Gayathri et al. in South India found a rate of 17.8%[7]. The convergence of these figures from disparate regions suggests that high-risk referral centres consistently encounter a greater burden, likely due to a combination of regional iodine status, genetic predisposition, and the selective referral of complicated or older pregnancies. The predominance of subclinical hypothyroidism (SCH), constituting 73.3% of all cases, aligns with the global and national pattern where SCH is 3-5 times more common than the overt form[10]. This highlights the "silent" nature of the epidemic, where the majority of affected women are asymptomatic yet potentially at risk for adverse obstetric and neurodevelopmental outcomes.

Our observation of a 2.6 times higher prevalence in women over 30 years of age (41.7% vs. 16.1%) reinforces a well-established epidemiological link. Advancing maternal age is a recognized risk factor for autoimmune thyroiditis and declining thyroid reserve[9]. This trend, though marginally non-significant (p=0.054) likely due to our modest sample size, carries strong clinical validity. It underscores the imperative for vigilant screening in this age group. The finding that the highest prevalence occurred in the first trimester (27.8%) is both expected and clinically critical. Physiologically, the first trimester places the greatest demand on maternal thyroid hormone production due to fetal dependence and the stimulatory effect of human chorionic gonadotropin (hCG)[1]. This temporal pattern has been corroborated by other studies; for example, a large cohort study by Cleary-Goldman et al. also noted a higher likelihood of thyroid hypofunction being identified earlier in gestation[9]. This trend strengthens the argument for first-trimester screening, as timely levothyroxine initiation during this window of fetal brain development is most beneficial[3].

The high prevalence, particularly of SCH, directly challenges the efficacy of a purely symptom-based or selective high-risk screening approach. Many women with SCH are asymptomatic, and risk-factor-based screening can miss a significant proportion, as demonstrated by Vaidya et al.[11]. Our data provide a compelling local rationale for advocating a universal first-trimester TSH screening protocol within our tertiary care framework. Implementing such a protocol would ensure the systematic identification and treatment of affected women, potentially mitigating associated risks of miscarriage, preterm birth, and suboptimal child neurodevelopment. Furthermore, the establishment of pregnancy- and population-specific trimesteral reference ranges for thyroid function tests, as recommended by Stagnaro-Green et al., is an urgent next step[8]. Using a fixed cut-off (TSH >4.0 mIU/L) as in this study, while pragmatic, may lead to misclassification, and locally derived ranges would enhance diagnostic precision.

CONCLUSION

In conclusion, this study reveals a high prevalence of hypothyroidism (20.3%), predominantly subclinical, among pregnant women at our tertiary care teaching hospital, with a notable predilection for older mothers and the first trimester. These results echo concerning trends from similar high-risk settings in India. They serve as a critical local evidence base to advocate for a paradigm shift towards universal first-trimester thyroid

screening within our institution. Future prospective studies with larger sample sizes, incorporating thyroid antibody status and culminating in the development of trimester-specific reference ranges, are essential to refine diagnosis and optimize maternal-fetal care strategies.

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