The Research of Medical Science Review
ISSN: 3007-1208 & 3007-1216 Volume 3, Issue 7, 2025

FREQUENCY OF THYROID DISORDERS IN OBSTETRIC PATIENTS: A CROSS-SECTIONAL STUDY FROM LAHORE

Dr Shazma Ansar[*1], Syed Taimoor Hashmi[2], Waqas Cheema[3], Ayesha Azhar Khan[4], Asma Amin Baig[5], Yousaf latif[6]

*[*1,2]PG Trainee Obstetrics and Gynaecology*
Hameed Latif Hospital\Arif Memorial Teaching Hospital Lahore
[3]CMO Emergency Arif Memorial Teaching Hospital
[4,5]Assistant professor Rashid Latif Medical college Lahore Obstetrics and Gynaecology Pakistan
[6]Professor Hameed Latif Hospital Lahore Obstetrics and Gynaecology Pakistan

[*1]shazma.ansar9595@gmail.com

DOI: https://doi.org/10.5281/zenodo.18278833

Keywords
Body Mass Index; Hypothyroidism; Hyperthyroidism; Pregnancy.

Article History
Received: 01 May 2025
Accepted: 01 July 2025
Published: 18 July 2025

Corresponding Author: *
Dr Shazma Ansar

Abstract

Objective: *Find out the frequency of thyroid disorders in pregnant women, and to analyze the relationship between these disorders and the selected maternal characteristics.*

Study Design: *Cross-sectional study.*

Place and Duration of Study: *Department of Obstetrics and Gynecology, Arif Memorial Teaching Hospital, Lahore, from January to June 2025.*

Methodology: *The study included 240 pregnant women with singleton pregnancies between 8–28 weeks of gestation, who were selected through non-probability consecutive sampling. Along with demographic variables, clinical variables like age, parity, gestational age, and body mass index were recorded. Data analysis was performed using SPSS version 25. Continuous variables were summarized as means and standard deviations and categorical variables were presented as frequency and percentages. The chi-square test was used to evaluate the association between the presence of thyroid dysfunction and maternal characteristics with $p \leq 0.05$ regarded as statistically significant.*

Results: *Out of total participants, thyroid dysfunction was detected in 55 individuals (22.9%). Among them, 40 women's cases (17%) were of hypothyroidism and 15 (6%) of hyperthyroidism. The correlation between thyroid dysfunction and body mass index was very strong ($p=0.001$) with the highest occurrence of the body mass index ≥30 kg/m². Maternal age ($p=0.316$), parity ($p=0.976$), and trimester of pregnancy ($p=0.868$) were not among the factors affecting thyroid dysfunction.*

Conclusion: *The population of pregnant women in this study area has a high prevalence of thyroid disorders, especially hypothyroidism, and the disorders are closely related to the body mass index.*

INTRODUCTION

It is well known that thyroid diseases during pregnancy have adverse fetomaternal outcomes if left undiagnosed or untreated(1). Thyroid gland enlarges during pregnancy by approximately 10%

in areas with adequate iodine and to a greater extent in regions with iodine deficiency such as Pakistan to meet requirement of fetal thyroid hormones during early pregnancy as thyroid gland in fetus begins functioning between 8–10 weeks of pregnancy(2). Thyroid hormones are necessary for brain development, neuronal multiplication, migration, and organization in fetus and their deficiency will lead to adverse pregnancy outcomes, including spontaneous or threatened abortion, preterm birth, preeclampsia, low birth weight and intrauterine growth restriction (IUGR), also increased perinatal mortality and neurodevelopmental delays such as attention deficit hyperactivity disorder (ADHD) along with maternal complications like thyrotoxic crisis or congestive heart failure(3,4).

Diagnosis of thyroid dysfunction is often delayed as symptoms mimic normal pregnancy symptoms. This overlap of symptoms highlights the importance of screening and appropriate interpretation of thyroid function tests in pregnancy. Globally, thyroid disorders affect approximately 2–3% of women in pregnancy with hyperthyroidism (mostly Graves' disease) affecting 0.2–0.4% and hypothyroidism in 0.5–3.5%(5). In a study 19.8% of pregnant women were diagnosed with thyroid dysfunction and among them 12.1% were with subclinical hypothyroidism, 4.1% with overt hypothyroidism, 2.2% subclinical hyperthyroidism and 0.7% overt hyperthyroidism(6).

Pregnant women are especially vulnerable to thyroid dysfunction due to increased physiological demands; a risk further heightened in iodine-deficient regions like Pakistan. But the local data on thyroid dysfunction in pregnancy is scarce and reported prevalence rates among Pakistani women range widely from 2.9% to 19.8% highlighting the need for updated, region specific research(6,7). This study aims to determine the prevalence of thyroid dysfunction (both hypothyroidism and hyperthyroidism) in pregnant women in our setting.

MATERIALS AND METHODS

This was a cross-sectional observational conducted in Obstetrics and Gynecology Department of Arif Memorial Teaching Hospital, Lahore. The study was completed in six months (January 2025 to June 2025) with ethical clearance from the Institutional Review Board (IRB # HLH/ADM/IRB/2025-022 dated 05 January 2025).

Inclusion criteria: All pregnant women between 8 and 28 weeks of gestation, with singleton pregnancies confirmed on ultrasound and no known systemic illnesses, were included.

Exclusion criteria: Diagnosed cases of thyroid dysfunction, or with prior medical conditions such as diabetes mellitus, chronic hypertension, or molar pregnancy, were excluded from the study to minimize confounding effects on thyroid hormone levels.

The sample size was calculated using the WHO formula for estimation of a single population proportion. Assuming an expected prevalence of thyroid disorders in pregnancy of 19.8%, with a 95% confidence level and a margin of error of 5%, the calculated sample size was 244. For feasibility, a sample size of 240 pregnant women was finally included in the study.

240 pregnant women were included using non-probability consecutive sampling technique. Participants were recruited from antenatal outpatient and inpatient departments of the hospital. All women who met the inclusion criteria were included after taking informed consent. Data was collected with use of a structured proforma, which included demographic and clinical variables such as age, parity, gestational age (confirmed by date of last menstrual period and ultrasound) and body mass index (BMI).

Self-administered questionnaire was used with Cronbach alpha value of 0.13. Serum Thyroid-Stimulating Hormone (TSH) level was measured to evaluated thyroid function in all enrolled participants. Interpretation of TSH results was based on trimester-specific reference ranges, as recommended by current clinical guideline(8): First trimester range: 0.1–2.5 μIU/mL; Second

trimester range: 0.2–3.0 µIU/mL; Third trimester range: 0.3–3.0 µIU/mL.

Women with thyroid stimulating hormone values falling outside these ranges were further investigated with serum levels of free thyroxine (FT4) and free triiodothyronine (FT3) to differentiate between subclinical and overt thyroid dysfunction. All laboratory analyses were conducted at the hospital's diagnostic laboratory using standard assay techniques.

All collected data was then analyzed using Statistical Package for Social Sciences version 27. Continuous variables such as maternal age, BMI and gestational age, were summarized as means and standard deviations. But categorical variables like parity, thyroid function status were presented as frequency and percentages. The data were stratified based on potential effect modifiers such as age, parity, and BMI to assess subgroup variations. Following stratification, the Chi-square test was used to assess associations between thyroid dysfunction and categorical variables considering p-value of <0.05 statistically significant.

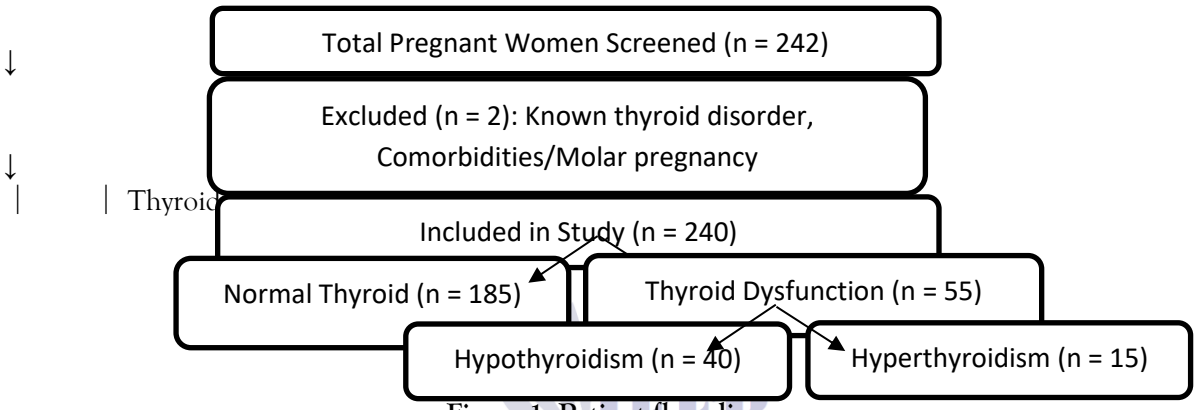

Figure-1: Patient flow diagram

RESULTS

Table 1 shows the demographic profile of included women(n = 240). The mean maternal age was 29.35 ± 6.18 years, with the majority aged between 25–30 years (43.3%). The mean BMI was 26.96 ± 5.02 kg/m², with 33.8% of women classified as obese (BMI ≥30). Parity was nearly evenly distributed, with 50.8% nulliparous and 49.2% multiparous. Most women were in their second trimester at presentation (60.8%), followed by the first trimester (34.2%).

Table- I : Baseline Demographic Profile(n=240)

Variable	Category	Frequency n (%)	Mean ± SD
Age (years)		–	29.35 ± 6.18
	<25	74 (30.8)	
	25–30	104(43.3)	
	>30	62(25.8)	
BMI (kg/m²)		–	26.96 ± 5.02
	<20	25(10.4)	
	20–24.9	67 (27.9)	
	25–29.9	67 (27.9)	
	≥30	81(33.8)	
Parity	Nulliparous	122 (50.8)	
	Multiparous	118(49.2)	

Trimester	1st	82 (34.2)	
	2nd	146(60.8)	
	3rd	12 (5.0)	

Thyroid dysfunction was identified in 55 women (22.9%), including 40 cases of hypothyroidism (17%) and 15 of hyperthyroidism (6%).

The frequency of hypothyroidism appears to increase with rising BMI and the maximum number of cases were observed in the BMI >30 group. A similar trend, though less pronounced, is noted for hyperthyroidism. In contrast, women with normal thyroid function is highest in normal BMI category (20–24.9) and declines as BMI increases. These findings highlight a potential relationship between elevated BMI and thyroid dysfunction in pregnancy.

Figure 2 demonstrates the distribution of thyroid status among pregnant women across the three trimesters. Most of the cases were identified during second trimester, showing that hypothyroidism and hyperthyroidism more frequently diagnosed during this period compared to the first and third trimesters. Normal thyroid function remained the most common status across all trimesters, particularly in the second trimester. Very few cases of thyroid dysfunction were recorded in the third trimester, likely due to early antenatal detection.

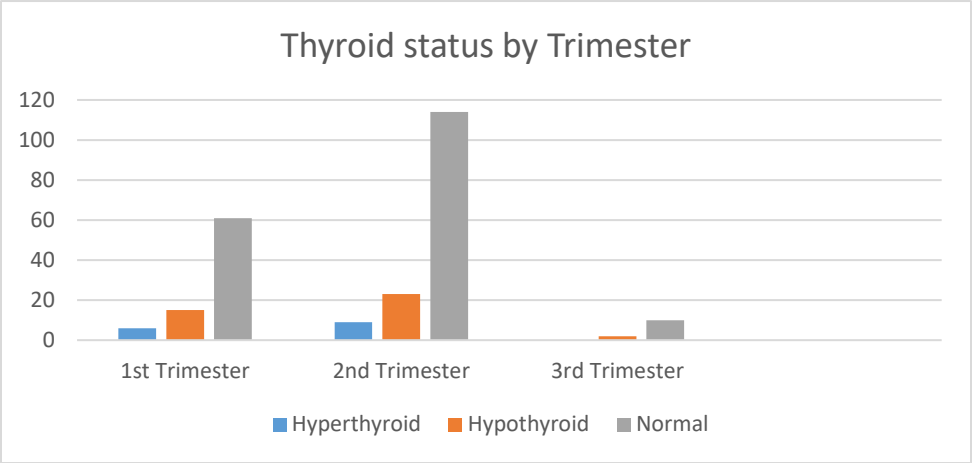

Fig-2: Trimester wise distribution of thyroid dysfunction

Table 2 shows distribution of thyroid disorders across maternal variables along with chi-square analysis. A statistically significant association was observed between thyroid dysfunction and BMI (p = 0.001), with the highest frequency observed in women with BMI ≥30. No statistically significant associations were observed with age (p value 0.316), parity (p value 0.976), or trimester (p = 0.868), suggesting BMI as the primary maternal factor linked to thyroid abnormalities in pregnancy.

Table-Ⅱ: Frequency of Thyroid Disorder by Maternal Variables with Chi-Square Analysis(n=240)

Variable	Category	Thyroid Disorder (n)	Normal (n)	p-value
Age	<25	16	69	0.316
	25–30	22	61	
	>30	17	55	
BMI	<20	7	18	0.001

	20–24.9	5	62	
	25–29.9	12	55	
	≥30	31	50	
Parity	Multiparous	27	91	0.976
	Nulliparous	28	94	
Trimester	1st	21	61	0.868
	2nd	32	114	
	3rd	2	10	

DISCUSSION

In our study involving 240 pregnant women, thyroid dysfunction was identified in 22.9% of participants, including 17% with hypothyroidism and 6% with hyperthyroidism. The prevalence of thyroid dysfunction is varied in other studies in Africa (12%)(9), India (10.4%) and Belgium (15.3%)(10,11). The higher prevalence observed in our study may be linked to iodine deficiency in Pakistan due to inconsistent use of iodized salt. Additionally, factors such as rising obesity rates, consanguineous marriages, genetic predisposition, and limited preconception screening may contribute to the increased burden.

The maternal age in our study was 29.35 ± 6.18 years, with the majority (43.3%) between 25–30 years. No association was found between maternal age and thyroid dysfunction (p value 0.316) which aligns with findings from study who also found no significant relationship between age and thyroid status in pregnancy. Similarly, a study found that although most thyroid dysfunction cases occurred in the 26–30 year age group, the distribution across age categories was not statistically significant(12).

In our study, parity was almost evenly distributed, with 50.8% of women being nulliparous and 49.2% multiparous. Parity and thyroid dysfunction also showed no significant association (p value 0.976). This is in line with findings by Takyar *et al.*, who suggested that while parity alone does not independently trigger thyroid autoimmunity, it may contribute in the presence of genetic or environmental risk factors(13). In contrast, longitudinal research by Shariatzadeh *et al.* reported that higher parity may increase the risk of overt and subclinical thyroid disorders, potentially due to cumulative physiological stress and repeated hormonal changes during successive pregnancies(14).

In our study, most thyroid dysfunction cases were diagnosed during the second trimester but this was not statistically significant (p value 0.868) and prevalence remained relatively stable across trimesters. Similar findings were reported by a study while another study noted subclinical hypothyroidism was more in first trimester while overt hypothyroidism and subclinical hyperthyroidism predominating in later trimesters(15,16). These variations likely reflect peak physiological demands for thyroid hormones in early pregnancy due to elevated hCG and fetal development. These findings shows the fluctuating nature of thyroid function throughout pregnancy emphasizing the need for trimester-specific interpretation of thyroid function tests so that accurate diagnosis and management can be done(17,18).

In our study BMI emerged as most significant maternal factor associated with thyroid dysfunction with the highest prevalence observed in women with BMI ≥30 kg/m² (p = 0.001). This finding is consistent with international research, such as a study which noted a 3.6-fold higher risk of thyroid dysfunction in overweight women(19). A meta-analysis of 22 studies also confirmed that obesity significantly increases the risk of overt and subclinical hypothyroidism, Hashimoto's thyroiditis, and TPO antibody positivity(20). Underlying mechanisms may include chronic inflammation, disrupt leptin pathways, and heighten autoimmune activity(21). These findings align with the 2017 guidelines, which recommend targeted thyroid screening in pregnant women with risk factors like obesity,

family history, or autoimmune disorders. In resource-limited settings, selective screening based on metabolic risk factors like elevated BMI may be a more feasible and cost-effective approach than universal screening.

LIMITATIONS

This study had several limitations. First, BMI was recorded at the time of antenatal visit rather than pre-pregnancy, which may not reflect the patient's baseline metabolic status. Second, thyroid function was assessed only once during pregnancy, which may have led to underdiagnosis of late-onset dysfunction or overestimation of transient abnormalities.

Longitudinal designs with repeated thyroid function tests throughout pregnancy would provide a clearer understanding of the progression and timing of dysfunction. Also, interventional studies evaluating the impact of early treatment of subclinical hypothyroidism especially in high-BMI women on pregnancy and neonatal outcomes would offer valuable evidence for clinical guidelines and policymaking.

CONCLUSION

Thyroid dysfunction was detected in nearly one-fourth of the pregnant women studied, with hypothyroidism being more common. Among the maternal variables assessed, only a high BMI showed a statistically significant association with thyroid abnormalities. Considering the low-income background of our study population and the limited capacity of publicly funded healthcare systems to bear the cost of routine testing, universal thyroid screening may not be feasible. Instead, screening approach targeting high-risk women particularly those with elevated BMI offers a more practical and economically viable strategy to prevent adverse fetomaternal outcomes.

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