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ORIGINAL ARTICLE

Frequency of Hypothyroidism and its Association with Perinatal and Obstetric Morbidity Among Women Admitted for Delivery

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ABSTRACT

Background: Hypothyroidism is a common endocrine disorder in pregnancy and may adversely affect maternal and fetal outcomes. Limited local data are available regarding thyroid dysfunction among women presenting for delivery. This study aimed to determine the frequency of hypothyroidism and its association with obstetric and perinatal morbidity.

Methods: This hospital-based cross-sectional study was conducted at the Department of Obstetrics and Gynaecology, Abbasi Shaheed Hospital, Karachi, over six months. A total of 400 pregnant women aged 18–45 years with singleton pregnancies admitted for delivery were enrolled through non-probability consecutive sampling. Thyroid function tests were performed at admission, and participants were classified as euthyroid, subclinical hypothyroid, or overt hypothyroid. Obstetric and perinatal outcomes were recorded and analyzed using SPSS version 25, with $p<0.05$ considered statistically significant.

Results: Among 400 women, 287 (71.8%) were euthyroid and 113 (28.2%) had hypothyroidism, including 97 (24.3%) subclinical and 16 (4.0%) overt cases. No significant association was found between hypothyroidism and preeclampsia ($p = 0.274$), preterm delivery ($p = 0.301$), cesarean section ($p = 0.819$), low birth weight ($p = 0.392$), NICU admission ($p = 0.926$), or neonatal mortality ($p = 0.279$). **Conclusion:** Hypothyroidism, particularly subclinical hypothyroidism, was relatively common among women admitted for delivery. However, no significant association was observed with the evaluated obstetric or perinatal outcomes.

Keywords: Hypothyroidism, Obstetric Outcomes, Perinatal Outcomes, Pregnancy, Subclinical Hypothyroidism, Thyroid Dysfunction

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Introduction

Maternal hypothyroidism is one of the most common endocrine abnormalities encountered in pregnancy, which has been linked with poor pregnancy outcomes (1).

The thyroid hormones are known to play a vital role in maintaining maternal metabolism and ensuring physiological adaptations in pregnancy (2). In addition, thyroid hormones are important in fetal growth and development, particularly in early pregnancy when the fetus is dependent on maternal thyroid hormone production (3). Therefore, any disruption in thyroid hormone production in pregnancy may have a negative impact on the outcome (4).

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The prevalence of hypothyroidism in pregnancy varies in different populations (5). In the world population, the prevalence of overt hypothyroidism in pregnancy is approximately 0.3 to 0.5 percent, while 2 to 5 percent have subclinical hypothyroidism (6). However, in South Asian countries, the prevalence is higher, ranging from 8 to over 10 percent, which may be related to iodine deficiency, socioeconomic factors, poor antenatal care, and lack of thyroid screening in pregnancy (5,7).

Based on biochemical abnormalities, hypothyroidism in pregnancy is classified into two forms: overt and subclinical. In overt hypothyroidism, TSH is raised with decreased free thyroxine, while in subclinical hypothyroidism, TSH is raised with normal free thyroxine levels (8). Overt hypothyroidism is clinically apparent, while in subclinical hypothyroidism, the patient is usually asymptomatic or has nonspecific symptoms, which may resemble physiological changes in pregnancy (9). Therefore, in most cases, subclinical hypothyroidism is undiagnosed in the absence of screening.

There is considerable evidence to suggest that hypothyroidism in pregnant women is associated with an increased risk of adverse pregnancy outcomes (10). Research findings have shown an increased incidence of hypertensive diseases in pregnancy, preeclampsia, preterm births, and an increased incidence of operative deliveries in hypothyroid patients (11). In addition to these complications in pregnant hypothyroid patients, thyroid abnormalities are also associated with an increased incidence of adverse perinatal outcomes (12). Hypothyroidism in pregnant women is associated with an increased incidence of low birth weights, preterm births, and neonatal admissions to neonatal intensive care units (3). In addition to these complications, hypothyroidism in pregnant women is also associated with increased neonatal morbidity and mortality (13).

Recent international guidelines have refined recommendations regarding thyroid screening during pregnancy. The American Thyroid Association (ATA) recommends targeted thyroid function screening in women at high risk of thyroid disease rather than universal screening for all pregnant women, citing insufficient evidence to support routine population-wide testing. Nevertheless, these guidelines strongly emphasize the early diagnosis and appropriate management of overt hypothyroidism because untreated disease is associated with adverse maternal and fetal outcomes. The management of subclinical hypothyroidism remains an area of ongoing debate, highlighting the need for additional evidence from diverse populations to inform screening policies and clinical practice (14).

Despite considerable evidence to support hypothyroidism in pregnant women from different parts of the world, there is a relative scarcity of data from Pakistan regarding hypothyroidism in pregnant women, particularly those who present for delivery. Most studies done in different parts of the world to investigate hypothyroidism in pregnant women are based on patients who present for antenatal care. However, in developing countries like Pakistan, where access to health care is limited in many parts of the country and many pregnant women present for delivery alone, it is important to investigate hypothyroidism in pregnant women who present for delivery to understand its prevalence and potential association with pregnancy outcomes.

In many low- and middle-income countries, including Pakistan, a considerable proportion

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of pregnant women either receive inadequate antenatal care or present to tertiary care hospitals only at the time of delivery. Consequently, thyroid dysfunction frequently remains undiagnosed throughout pregnancy. Assessing thyroid function at admission for delivery therefore provides an opportunity to estimate the burden of previously unrecognized hypothyroidism in this population and offers clinically relevant information regarding women who may benefit from postpartum evaluation and counseling for future pregnancies. Evaluation of thyroid function in pregnant women who present for delivery can provide valuable insight into hypothyroidism in pregnant women and its potential association with pregnancy outcomes.

The current study was undertaken to identify the prevalence of hypothyroidism among women who were admitted for delivery in a tertiary care hospital, as well as its association with certain perinatal parameters, which include preeclampsia, preterm delivery, mode of delivery, low birth weight, admission in the neonatal ICU, and mortality.

Methods

This hospital-based cross-sectional study was conducted at the Department of Obstetrics and Gynaecology, Abbasi Shaheed Hospital, Karachi Medical and Dental College, Karachi, over a six-month period from 1 September 2025 to 1 March 2026. Ethical approval was obtained from the Institutional Ethics Review Board of Abbasi Shaheed Hospital before commencement of the study (Approval No. 321/ERB/ASH, dated 28 August 2025). Written informed consent was obtained from all participants prior to enrolment. Pregnant women aged 18–45 years with singleton pregnancies who were admitted for delivery, either in active labour or for elective caesarean section, were recruited using a non-probability consecutive sampling technique. Women with a previous diagnosis of thyroid disease before pregnancy, prior thyroid surgery or radioactive iodine ablation, multiple gestation, or use of medications known to interfere with thyroid function (including amiodarone and systemic corticosteroids) were excluded. Women receiving levothyroxine therapy for previously diagnosed hypothyroidism before pregnancy were also excluded to minimize the influence of treatment on thyroid function assessment. Critically ill women and those unwilling to participate were likewise excluded. The required sample size was calculated using the single population proportion formula. Assuming a prevalence of hypothyroidism of 10%, a 95% confidence level, and a 3% margin of error, the minimum required sample size was 384 participants. To compensate for possible incomplete data and enhance statistical precision, a total of 400 women were enrolled.

Data were collected using a structured proforma that included demographic characteristics, obstetric history, booking status, previous obstetric events, and maternal comorbidities including chronic hypertension, gestational diabetes mellitus, and anaemia. Variables such as maternal body mass index (BMI), gestational weight gain, smoking status, socioeconomic status, and thyroid treatment initiated during pregnancy were not routinely documented in the hospital records and therefore were not included in the analysis. Upon admission for delivery, 5 mL of venous blood was collected under aseptic conditions. Serum thyroid-stimulating hormone (TSH) and free thyroxine (FT4) concentrations were measured using a chemiluminescent microparticle immune-assay (CMIA) on the Abbott ARCHITECT i

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System (Abbott Diagnostics, Abbott Park, Illinois, USA) according to the manufacturer's instructions. Because thyroid function testing was performed at the time of delivery, participants were classified using third-trimester pregnancy-specific reference intervals. In accordance with the 2017 American Thyroid Association (ATA) Guidelines, laboratory-specific pregnancy reference ranges were preferred whenever available. In the absence of locally established pregnancy-specific reference intervals, the manufacturer's validated reference intervals were applied. The third-trimester reference ranges used for interpretation were TSH: 0.30–3.00 mIU/L and FT4: 0.70–1.20 ng/dL. Participants were categorized as euthyroid, subclinical hypothyroid, or overt hypothyroid based on serum TSH and FT4 concentrations. Obstetric outcomes evaluated included preeclampsia, preterm delivery, and mode of delivery. Preeclampsia was diagnosed according to the American College of Obstetricians and Gynecologists (ACOG) Practice Bulletin, defined as new-onset hypertension (blood pressure ≥140/90 mmHg on two occasions at least four hours apart after 20 weeks of gestation) accompanied by proteinuria (≥300 mg/24 hours or protein/creatinine ratio ≥0.3) or, in the absence of proteinuria, evidence of maternal end-organ dysfunction. Perinatal outcomes included low birth weight (<2500 g), neonatal intensive care unit (NICU) admission, and neonatal mortality before hospital discharge.

Data were entered and analysed using IBM SPSS Statistics version 25.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean ± standard deviation (SD), whereas categorical variables were summarized as frequencies and percentages. Associations between thyroid status and obstetric or perinatal outcomes were assessed using the Chi-square test or Fisher's exact test, as appropriate. Crude odds ratios (ORs) with 95% confidence intervals (CIs) were calculated to estimate the strength of associations. Owing to the cross-sectional design and the exploratory objective of the study, unadjusted analyses were performed; therefore, potential confounding by maternal comorbidities could not be completely excluded. A two-tailed p-value of <0.05 was considered statistically significant.

Results

A total of 400 women admitted for delivery were included in the final analysis. The mean maternal age was 30.66 ± 8.17 years, and the mean gestational age at delivery was 36.87 ± 1.83 weeks. The mean neonatal birth weight was 2988 ± 687.9 g. The mean gravidity and parity were 3.03 ± 1.41 and 1.34 ± 1.23, respectively.

The majority of participants resided in urban areas (63.0%) and 51.5% were booked cases. Most women were admitted in labor (69.8%), while 39.5% had a history of previous cesarean section. Chronic hypertension was present in 14.0%, gestational diabetes mellitus in 16.0%, anemia in 45.5%, and preeclampsia in 26.3% of participants. Baseline demographic and clinical characteristics are summarized in Table 1.

Table 1: Baseline Characteristics of the Study Population (n = 400)

Variable	Value
Maternal age (years)	30.66 ± 8.17
Gestational age (weeks)	36.87 ± 1.83
Birth weight (g)	2988 ± 687.9
Gravidity	3.03 ± 1.41
Parity	1.34 ± 1.23
Urban residence	252 (63.0%)
Booked cases	206 (51.5%)
Admission in labor	279 (69.8%)
Previous cesarean section	158 (39.5%)
Chronic hypertension	56 (14.0%)
Gestational diabetes mellitus	64 (16.0%)
Anemia	182 (45.5%)
Preeclampsia	105 (26.3%)

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Based on thyroid function testing at admission, 287 women (71.8%) were euthyroid. Hypothyroidism was identified in 113 women (28.2%), including 97 (24.3%) with subclinical hypothyroidism and 16 (4.0%) with overt hypothyroidism, as shown in Table 2.

Table 2: Frequency of Thyroid Status Among Study Participants

Thyroid Status	n (%)
Euthyroid	287 (71.8%)
Subclinical hypothyroidism	97 (24.3%)
Overt hypothyroidism	16 (4.0%)
Total hypothyroidism	**113 (28.2%)**

The association between maternal hypothyroidism and obstetric morbidity is presented in Table 3. Preeclampsia was observed in 30.1% of hypothyroid women compared to 24.7% of euthyroid women; however, this difference was not statistically significant (p = 0.274; OR = 1.31, 95% CI: 0.81–2.12).Preterm delivery occurred in 18.6% of hypothyroid women and 23.3% of euthyroid women, with no statistically significant association (p = 0.301; OR = 1.26, 95% CI: 0.81–1.95).Cesarean section rates were comparable between hypothyroid (38.1%) and euthyroid women (34.8%), with no statistically significant difference (p = 0.819).

Table 3: Association of Hypothyroidism with Obstetric Morbidity

Outcome	Euthyroid n (%)	Hypothyroid n (%)	OR (95% CI)	p-value
Preeclampsia	71 (24.7%)	34 (30.1%)	1.31 (0.81–2.12)	0.274
Preterm delivery	67 (23.3%)	21 (18.6%)	1.26 (0.81–1.95)	0.301
Cesarean section	100 (34.8%)	43 (38.1%)	—	0.819

Perinatal outcomes among hypothyroid and euthyroid women are shown in Table 4. Low birth weight was observed in 23.0% of neonates born to hypothyroid mothers and 27.2% of those born to euthyroid mothers, with no statistically significant association (p = 0.392; OR = 1.18, 95% CI: 0.80–1.74). NICU admission occurred in 30.1% of neonates in the hypothyroid group and 29.6% in the euthyroid group (p = 0.926; OR = 0.98, 95% CI: 0.71–1.37). Neonatal mortality was low in both groups, with no statistically significant difference (p = 0.279, Fisher's exact test).

Table 4: Association of Hypothyroidism with Perinatal Morbidity

Outcome	Euthyroid n (%)	Hypothyroid n (%)	OR (95% CI)	p-value
Low birth weight	78 (27.2%)	26 (23.0%)	1.18 (0.80–1.74)	0.392
NICU admission	85 (29.6%)	34 (30.1%)	0.98 (0.71–1.37)	0.926
Neonatal death	6 (2.1%)	2 (1.8%)	—	0.279*

* Fisher's exact test applied.

Among hypothyroid women, preeclampsia and preterm delivery were more frequent in overt hypothyroidism compared to subclinical hypothyroidism, while cesarean section rates were similar in both groups. Low birth weight and NICU admission were observed more frequently among women with subclinical hypothyroidism. These subgroup findings were exploratory and are summarized descriptively due to the small number of overt hypothyroid cases.

Discussion

The present study aimed to determine the prevalence of hypothyroidism and its relationship to obstetric and perinatal complications among women admitted for delivery. The study found a relatively higher prevalence of hypothyroidism at 28.2%. However, there were no statistically

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significant associations between maternal hypothyroidism and obstetric complications such as preeclampsia, preterm birth, mode of delivery, low birth weight, NICU admission, and mortality.

The prevalence of hypothyroidism found in this study is similar to that reported in other South Asian countries (7,9). Other authors have reported that the prevalence of hypothyroidism is higher in South Asian countries due to iodine deficiency, lack of antenatal screening for hypothyroidism, and inequalities in access to healthcare services (15,16,17,18). Conversely, the prevalence of hypothyroidism is relatively lower in high-income countries due to regular screening for hypothyroidism and better nutritional status of the population (19). The higher prevalence of subclinical hypothyroidism may have contributed to the overall prevalence of hypothyroidism in this study.

The absence of statistically significant associations between hypothyroidism and obstetric complications may be due to several reasons. First, subclinical hypothyroidism is more common than overt hypothyroidism. The clinical impact of subclinical hypothyroidism may be less pronounced than that of overt hypothyroidism. Pregnancy is a complex condition that is influenced by many factors. Other determinants of pregnancy outcomes may have influenced the study findings (20,21,22). The setting of this study may have influenced the study findings because the hospital is a tertiary care hospital. Another important consideration is the timing of thyroid function assessment. Thyroid status was evaluated only at the time of admission for delivery, whereas several obstetric complications, including preeclampsia and fetal growth restriction, generally develop earlier during pregnancy. Consequently, thyroid hormone levels measured at delivery may not accurately represent thyroid status during the critical stages of placental and fetal development. Therefore, the cross-sectional design of the present study does not permit establishment of temporal or causal relationships between maternal thyroid dysfunction and pregnancy outcomes.

In addition, pregnancy outcomes are influenced by numerous maternal and obstetric factors. Although information regarding chronic hypertension, gestational diabetes mellitus, and anaemia was available, important variables such as maternal body mass index, gestational weight gain, smoking status, socioeconomic status, and thyroid treatment initiated during pregnancy were not available for analysis. Furthermore, adjusted multivariable analyses were not performed; therefore, the possibility of residual confounding cannot be excluded.

In addition, an exploratory analysis indicated a trend towards a worse outcome in overt compared to subclinical cases of hypothyroidism. This is in keeping with the literature that suggests that overt cases have a worse outcome than subclinical cases. However, the small number of patients with overt hypothyroidism made it difficult to make any definitive conclusions (23,24).

The relatively high prevalence of hypothyroidism observed at the time of delivery indicates that thyroid dysfunction remains an important clinical finding among pregnant women in this setting. However, because no statistically significant association was observed between hypothyroidism and the evaluated obstetric or perinatal outcomes, these findings should be interpreted with caution. Rather than supporting universal screening, the present study highlights the need for larger prospective studies evaluating thyroid function earlier in pregnancy to better define the role of targeted screening and

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timely management in improving maternal and neonatal outcomes.

Strength of the study: A major strength of the present study is the inclusion of 400 women admitted for delivery at a tertiary care hospital, providing robust local evidence regarding the frequency of hypothyroidism among women presenting for delivery in Pakistan. Additionally, both obstetric and perinatal outcomes were included in the present paper.

Limitations

The limitations of the present paper include the fact that it was a cross-sectional study and was conducted in a single hospital. Additionally, thyroid status was only measured at delivery rather than in early pregnancy. Finally, although immediate neonatal outcomes such as low birth weight, NICU admission, and neonatal mortality were evaluated, long-term neonatal outcomes, including growth and neurodevelopment, were beyond the scope of the present study.

Future studies should include a prospective cohort design in which women are studied in early pregnancy. Additionally, the status of the women in terms of receiving treatment should be included. Finally, neonatal outcomes should also be included in these studies.

Conclusion

Hypothyroidism, particularly subclinical hypothyroidism, was relatively common among women admitted for delivery. However, no statistically significant association was observed between hypothyroidism and the obstetric or perinatal outcomes evaluated in this study. These findings should be interpreted in light of the cross-sectional design and the timing of thyroid function assessment. Further prospective studies evaluating thyroid function earlier in pregnancy are required to clarify the role of thyroid dysfunction in adverse maternal and neonatal outcomes and to inform future screening strategies.

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All the authors agree to take responsibility for every facet of the work, making sure that any concerns about its integrity or veracity are thoroughly examined and addressed.	