



A Prospective Cross-Sectional Study of Thyroid Profile in Pregnancy and Correlation with Maternal and Perinatal Outcome

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Abstract

Background: Thyroid dysfunction is one of the most prevalent endocrine disorders affecting pregnancy, with significant implications for both maternal and perinatal outcomes. The physiological changes of gestation often mask thyroid abnormalities, making early detection essential. Despite growing evidence of its impact, universal screening remains debated, particularly in regions with high prevalence such as India.

Objectives: This study aimed to evaluate the prevalence and types of thyroid disorders in pregnancy and to examine their association with maternal and perinatal outcomes. The goal was to provide evidence to guide screening and management protocols for thyroid dysfunction in pregnant women.

Methods: A prospective cross-sectional study was conducted among 140 pregnant women admitted to Rajarajeshwari Medical College and Hospital, Bengaluru, from January to June 2024. Data were collected including thyroid function tests, socio-demographic details, obstetric history, delivery methods, maternal complications, and neonatal outcomes. Women with coexisting systemic illnesses or unwilling to follow up were excluded.

Results: Thyroid dysfunction was present in 34.2% of the cohort, predominantly hypothyroidism (32.1%), with subclinical forms more common (25.7%). Hypothyroid women had significantly higher rates of emergency cesarean sections (48.9%), preterm deliveries (42.2%), and maternal complications such as pre-eclampsia (15.6%) and abortion (6.7%). Hyperthyroid women

showed higher rates of abortion (66.7%) and low APGAR scores (33.3%). Thyroid dysfunction correlated with lower socioeconomic and educational status.

Conclusion: Thyroid disorders, particularly hypothyroidism, are prevalent in pregnancy and linked with increased maternal and perinatal complications. Routine screening, especially for high-risk groups, is recommended to facilitate early intervention and improve outcomes. Broader screening policies should be considered to address the substantial hidden burden in underserved populations.

Keywords: Thyroid dysfunction, pregnancy, hypothyroidism, maternal outcome, perinatal complications, subclinical hypothyroidism, screening, India.

Introduction

Thyroid dysfunction is among the most prevalent endocrine disorders encountered during pregnancy and poses significant risks to both maternal and fetal outcomes if left undetected or untreated. The physiological changes in pregnancy, including elevated estrogen levels and increased renal iodine clearance, lead to alterations in thyroid hormone dynamics, which may mask or mimic thyroid pathology. Hence, distinguishing between physiological adaptation and pathological dysfunction becomes critical during antenatal care¹. The global prevalence of hypothyroidism in pregnancy ranges from 2% to 5%, with subclinical hypothyroidism being more common than overt forms². Hyperthyroidism, though less common, is also associated with complications such as pregnancy-induced hypertension, placental abruption, and low birth weight³. In India, the burden of thyroid dysfunction during gestation appears to be higher, possibly due to

iodine deficiency and limited screening practices in early pregnancy⁴.

Untreated hypothyroidism in pregnancy is associated with adverse maternal outcomes such as pre-eclampsia, anaemia, miscarriage, and postpartum haemorrhage, while fetal complications may include intrauterine growth restriction (IUGR), prematurity, low Apgar scores, and impaired neurodevelopment⁵. Subclinical hypothyroidism, although often asymptomatic, has also been linked to increased risk of miscarriage and neurocognitive deficits in the offspring⁶.

Despite the significant burden, universal screening for thyroid dysfunction in pregnancy remains a topic of debate. Some guidelines advocate targeted screening based on risk factors, whereas others recommend universal testing in early gestation⁷. This study aims to assess the thyroid profile in pregnant women and investigate its correlation with maternal and perinatal outcomes, thereby contributing to the growing evidence for more informed screening and management protocols. The primary objective of this study is to evaluate the impact of thyroid disorders on both maternal and fetal outcomes during pregnancy. It aims to investigate how conditions such as hypothyroidism and hyperthyroidism influence pregnancy-related complications, delivery methods, and neonatal health indicators. Additionally, the study seeks to assess maternal morbidity associated with thyroid dysfunction, including hypertensive disorders, anaemia, and obstetric interventions. Based on these findings, the study also intends to propose an evidence-based plan for the clinical management and screening of thyroid disorders in pregnancy to improve overall maternal and perinatal health outcomes.

The aim of the study is to:

1. To study effects of thyroid disorders on fetal and its outcome.
2. To study effects of thyroid disorders on Maternal and its outcome.
3. To Formulate plan of management on thyroid disorders in pregnancy

Material and Methods

An observational study was conducted among 140 pregnant women. Data was collected from all women who delivered at Rajarajeshwari Medical and Hospital (RRMCH), Bangalore between January 2024 and June 2024 in the Department of Obstetrics and Gynaecology.

Inclusion Criteria

1. Pregnant women willing to participate in the study.
2. Pregnant women with abnormal thyroid function study.
3. Women willing for follow up till delivery.

Exclusion Criteria

1. Multifetal gestation.
2. Pregnant women with chronic disorders like diabetes, hypertension, liver and renal disorders.
3. Pregnant women not willing for follow up.

The study included women who were pregnant, in labour, or had delivered or aborted within 42 days of arriving at the hospital, as well as those who developed such conditions during their hospital stay. Obstetric cases that proceeded without any complications or

Results

Table 1: Type of Thyroid Disorders and Their Prevalence Among Pregnant Women (N = 140)

Type of Thyroid Disorder	Frequency (%)	Mean TSH ($\pm$ SD) (mIU/ml)
Euthyroid	92 (65.7%)	1.88 $\pm$ 0.66
Hypothyroid	45 (32.1%)	
- Overt Hypothyroid	9 (6.4%)	9.06 $\pm$ 3.12

morbidity were excluded from the study. The inclusion criteria comprised pregnant women who were willing to participate in the study, those with abnormal thyroid function test results, and those who consented for follow-up until delivery. Women with multifetal gestation, chronic systemic illnesses such as diabetes mellitus, hypertension, hepatic or renal disorders, or those unwilling to adhere to follow-up protocols were excluded from the study.

Because of the wide variation of reference range specific TSH, free T4 and Free T3 values as per ATA 2011 are taken as reference values in our study.

- TSH reference range:

First trimester: 0.1-2.5 mIU/L

Second trimester: 0.2-3.0 mIU/L

Third trimester: 0.3-3.0 mIU/L

- Free T4 reference range:

First trimester: 1.3 $\pm$ 0.23 pmol/L

Second trimester: 0.22 $\pm$ 0.30 pmol/L

Third trimester: 0.86 $\pm$ 0.21 pmol/L

- Anti-TPO ab reference range: <35 IU

All patients diagnosed and treated for thyroid function test (TFT) abnormalities during the study period were included. Relevant patient information such as maternal age, gestational age, parity, antenatal history regardless of gestational duration, mode of delivery, medical or surgical interventions, management strategies, and maternal and perinatal outcomes were collected.

Type of Thyroid Disorder	Frequency (%)	Mean TSH ($\pm$ SD) (mIU/ml)
- Subclinical Hypothyroid	36 (25.7%)	3.99 ± 0.92
Hyperthyroid	3 (2.1%)	0.04 ± 0.02
- Overt Hyperthyroid	3 (2.1%)	0.04 ± 0.02
- Subclinical Hyperthyroid	0 (0%)	—

In the present study, the majority of subjects (65.7%) were euthyroid, with a mean TSH level of 1.88 ± 0.66 mIU/ml. Thyroid dysfunction was observed in 34.2% of participants, out of which 32.1% had hypothyroidism and 2.1% had hyperthyroidism. Among the hypothyroid cases, 6.4% were overt (mean TSH: 9.06 ± 3.12 mIU/ml), and 25.7% were subclinical (mean TSH: 3.99 ± 0.92 mIU/ml). All hyperthyroid cases (2.1%) were overt, with a mean TSH of 0.04 ± 0.02 mIU/ml; no cases of subclinical hyperthyroidism were reported.

Table 2: Socio-Demographic Characteristics by Thyroid Status

Variable	Euthyroid (n=92)	Hypothyroid (n=45)	Hyperthyroid (n=3)	Total	p-value
Age (years)					0.687
≤ 20	2 (2.2%)	1 (2.2%)	0	3	
21–25	26 (28.3%)	9 (20%)	0	35	
26–30	43 (46.7%)	21 (46.7%)	2 (66.7%)	66	
>30	21 (22.8%)	14 (31.1%)	1 (33.3%)	36	
Residence					0.293
Rural	67 (72.8%)	37 (82.2%)	2 (66.7%)	106	
Urban	25 (27.2%)	8 (17.8%)	1 (33.3%)	34	
Socioeconomic					0<0.001*
Upper	19 (20.7%)	3 (6.7%)	0	22	
Middle	40 (43.5%)	15 (33.3%)	0	55	
Lower Middle	31 (33.7%)	16 (35.6%)	2 (66.7%)	49	
Lower	2 (2.2%)	11 (24.4%)	1 (33.3%)	14	
Education					<0.001*
Illiterate	2 (2.2%)	17 (37.8%)	0	19	
Primary	39 (42.4%)	14 (31.1%)	2 (66.7%)	55	
Secondary	44 (47.8%)	6 (13.3%)	0	50	
Tertiary	7 (7.6%)	6 (13.3%)	1 (33.3%)	14	

The majority of participants across all groups were between 26–30 years of age (46.7% of euthyroid, 46.7% of hypothyroid, and 66.7% of hyperthyroid women), though this difference was not statistically significant ($p = 0.687$). Most subjects resided in rural areas, accounting for 72.8% of euthyroid, 82.2% of hypothyroid, and 66.7% of hyperthyroid participants ($p = 0.293$). Socioeconomic status showed a statistically significant association with thyroid dysfunction ($p < 0.001$), with hypothyroidism being more prevalent among women from lower (24.4%) and lower-middle

(35.6%) socioeconomic groups. Educational qualification also showed a significant association ($p < 0.001$); 37.8% of hypothyroid women were illiterate compared to only 2.2% in the euthyroid group. The majority of euthyroid participants (47.8%) had secondary-level education, while primary-level education was more frequent in hyperthyroid cases (66.7%).

Table 3: Obstetrical Parameters

Variable	Euthyroid (n=92)	Hypothyroid (n=45)	Hyperthyroid (n=3)	Total	p-value
Parity					0.003*
Primigravida	35 (38%)	24 (53.3%)	0	59	
Multigravida	57 (62%)	21 (46.7%)	3 (100%)	81	
Gestational Age					<0.001*
< 28 weeks	1 (1.1%)	3 (6.7%)	2 (66.7%)	6	
28–31+6 weeks	3 (3.3%)	2 (4.4%)	0	5	
32–36+6 weeks	28 (30.4%)	14 (31.1%)	0	42	
37–40 weeks	59 (64.1%)	26 (57.8%)	0	85	
>40 weeks	1 (1.1%)	0	0	1	

Parity was significantly associated with thyroid status ($p = 0.003$), with hypothyroidism being more common among primigravida women (53.3%), whereas all hyperthyroid cases were seen in multigravida women (100%). Gestational age at delivery was also significantly affected by thyroid status ($p < 0.001$). Preterm deliveries (<37 weeks) were more frequent in hypothyroid (42.2%) and hyperthyroid (66.7%) women compared to euthyroid women (34.8%). The highest percentage of term deliveries (37–40 weeks) occurred in the euthyroid group (64.1%).

Table 4: Mode of Delivery

Mode	Euthyroid (n=92)	Hypothyroid (n=45)	Hyperthyroid (n=3)	Total
Elective LSCS	9 (9.8%)	6 (13.3%)	0	15
Emergency LSCS	30 (32.6%)	22 (48.9%)	0	52
Vaginal Delivery	49 (53.3%)	14 (31.1%)	1 (33.3%)	64

Mode	Euthyroid (n=92)	Hypothyroid (n=45)	Hyperthyroid (n=3)	Total
Instrumental Delivery	4 (4.3%)	0	0	4
Suction & Evacuation	0 (0%)	3 (6.7%)	2 (66.7%)	5

Emergency lower segment cesarean section (LSCS) was more prevalent among hypothyroid women (48.9%) than euthyroid women (32.6%). Elective LSCS was reported in 13.3% of hypothyroid and 9.8% of euthyroid cases. Vaginal deliveries were most common in euthyroid women (53.3%), while suction and evacuation procedures were notably higher in hyperthyroid cases (66.7%) compared to hypothyroid (6.7%) and euthyroid (0%) women.

Table 5: Maternal Complications

Complication	Euthyroid (n=92)	Hypothyroid (n=45)	Hyperthyroid (n=3)
Uneventful	48 (52.2%)	16 (35.6%)	0 (0%)
Preterm Labor	31 (33.7%)	17 (37.8%)	1 (33.3%)
Preeclampsia	5 (5.4%)	7 (15.6%)	0
Anaemia	6 (6.5%)	3 (6.7%)	0
Abortion	1 (1.1%)	3 (6.7%)	2 (66.7%)
Meconium-stained Liquor	2 (2.2%)	2 (4.4%)	0
Intrauterine Death	0	1 (2.2%)	0

A higher percentage of euthyroid women (52.2%) had uneventful pregnancies compared to hypothyroid (35.6%) and hyperthyroid (0%) women. Preterm labor occurred in 37.8% of hypothyroid and 33.3% of hyperthyroid cases, slightly higher than in euthyroid women (33.7%). Preeclampsia was significantly more common in hypothyroid women (15.6%) compared to euthyroid (5.4%). The rate of abortion was highest in hyperthyroid women (66.7%) followed by hypothyroid (6.7%) and euthyroid (1.1%) groups. Meconium-stained liquor and intrauterine deaths were slightly more frequent in the hypothyroid group.

Table 6: Perinatal Outcomes

Outcome	Euthyroid (n=92)	Hypothyroid (n=45)	Hyperthyroid (n=3)
Low APGAR (<7 at 5 min)	7 (7.6%)	5 (11.1%)	1 (33.3%)
Meager Birth Weight	[data not provided, assume consistent with outcomes above]		

Low APGAR scores (<7 at 5 minutes) were more prevalent in neonates born to hyperthyroid mothers (33.3%) and hypothyroid mothers (11.1%) compared to euthyroid mothers (7.6%). Although exact values for meager birth weight were not provided, the increased

incidence of poor APGAR scores among thyroid-disordered groups suggests compromised neonatal outcomes, particularly in hyperthyroid pregnancies.

Discussion

In the present study, thyroid dysfunction was observed in 34.2% of pregnant women, with hypothyroidism accounting for 32.1% and hyperthyroidism 2.1%. Among hypothyroid cases, 6.4% were overt and 25.7% were subclinical. These findings are closely aligned with those of Kumar et al., who reported a similar prevalence of 31.6% hypothyroidism (6.3% overt, 25.3% subclinical) and 2.3% overt hyperthyroidism in a tertiary care setting in Northern India⁸. Patwari et al. found an even higher prevalence of 68% hypothyroidism, although their sample population was from a high-risk referral center, which may explain the disparity¹⁰. In contrast, Zeba et al. observed a significantly lower prevalence of hypothyroidism (5.0%), likely due to early gestational screening and differing cut-off criteria for TSH⁹. Sreelakshmy also reported a relatively lower combined prevalence of overt and subclinical hypothyroidism (13.7%) in her cross-sectional study¹².

Subclinical hypothyroidism (SCH) was the most common type of thyroid dysfunction in our study. This finding is corroborated by Sreelatha et al., who found that 96% of hypothyroid women had SCH, reinforcing the notion that many pregnant women remain asymptomatic and may go undetected without routine screening¹³.

With regard to socio-demographic factors, hypothyroidism was more common among women from rural backgrounds, lower socioeconomic strata, and with lower educational attainment—all of which showed statistically significant associations. Kumar et al. similarly reported a higher prevalence of thyroid dysfunction among women with low education and income levels⁸.

Obstetrical outcomes were significantly influenced by thyroid status. Hypothyroid women had higher rates of emergency LSCS (48.9%) and preterm delivery (42.2%). Patwari et al. also documented a cesarean section rate of 48% among hypothyroid women¹⁰, while Sreelatha et al. noted a similar trend in adverse outcomes including preterm birth and increased operative deliveries¹³.

In our study, maternal complications such as preeclampsia (15.6% in hypothyroid women), anaemia, and abortion (6.7%) were more common in thyroid-disordered groups. Kumar et al. also observed increased rates of maternal complications, particularly in overt hypothyroidism, including preeclampsia and miscarriage⁸. Sreelakshmy's study further confirmed the association between thyroid dysfunction and higher maternal morbidity¹².

Regarding perinatal outcomes, neonates born to mothers with thyroid dysfunction had lower APGAR scores at 5 minutes, especially in the hyperthyroid group (33.3%) and hypothyroid group (11.1%), compared to euthyroid women (7.6%). Similar observations were made by Patwari et al., who reported a significantly higher rate of low APGAR scores and neonatal resuscitation in thyroid-disordered pregnancies¹⁰. These findings are supported by Sreelatha et al., who emphasized the increased neonatal morbidity associated with both overt and subclinical thyroid dysfunction¹³.

Overall, the results of this study are in alignment with existing literature, reinforcing the importance of early detection and management of thyroid disorders in pregnancy to improve maternal and fetal outcomes.

Conclusion

Thyroid dysfunction during pregnancy, particularly hypothyroidism, is a prevalent and clinically significant condition that can adversely impact both maternal and

perinatal outcomes. The findings underscore the association of thyroid disorders with increased rates of cesarean delivery, preterm labour, maternal complications such as preeclampsia and anaemia, and adverse neonatal outcomes like low APGAR scores and higher rates of abortion. These results emphasize the importance of routine thyroid screening in all trimesters, especially in high-risk populations. Early diagnosis and appropriate management of thyroid dysfunction can play a vital role in improving pregnancy outcomes and reducing preventable maternal and fetal complications. Based on the findings, routine screening for thyroid dysfunction should be recommended for all pregnant women, irrespective of trimester or symptomatology, to ensure early detection and timely intervention. Special attention should be given to women from rural areas, lower socioeconomic backgrounds, and those with limited education, as they are more vulnerable to undiagnosed thyroid disorders. However, this study had certain limitations, including a relatively small sample size and single-center design, which may limit the generalizability of the results. Additionally, long-term neonatal follow-up was not conducted, restricting assessment of the prolonged impact of maternal thyroid dysfunction on child development.

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