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Original Research Article

Hypothyroidism and its influence on maternal and perinatal outcomes: insights from a hospital-based retrospective study

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ABSTRACT

Background: Hypothyroidism during pregnancy is a prevalent endocrine disorder that significantly impacts maternal and perinatal health in the form of infertility, early pregnancy loss, PIH, anaemia, IUGR, PROM, preterm labour, neonatal mortality and morbidity. This retrospective hospital-based study aimed to evaluate the maternal and fetal outcomes associated with hypothyroidism in pregnant women.
Methods: Medical records of pregnant women diagnosed with hypothyroidism were reviewed to assess clinical characteristics, treatment status, and pregnancy outcomes. Maternal complications such as anaemia, preeclampsia, PPH, hypertension, miscarriage were recorded alongside perinatal outcomes including preterm birth, low birth weight, and intrauterine growth restriction. A total of 550 antenatal women with singleton pregnancies and without any pr-existing medical disorder were screened. All patients were monitored up to the point of delivery, allowing for comparison of outcomes across the three groups.
Results: Among the study cohort of 550 antenatal women, 70 were found to have hypothyroidism with an estimated prevalence of 12.72, largely comprising subclinical cases. A higher incidence of hypothyroidism was seen among multigravida patients. Lower segment cesarean section (LSCS) was the most common mode of delivery in the women with hypothyroidism. In addition, hypothyroid mothers experienced higher incidences of adverse outcomes such as preeclampsia, miscarriage, preterm labor, low birth weight infants, IUGR, foetal distress and need for NICU admission as compared to euthyroid mothers. Early identification and treatment with levothyroxine were associated with improved maternal and fetal outcomes.
Conclusions: Hypothyroidism in pregnancy is associated with significant risks for both mother and child. Routine screening and timely treatment are critical measures to mitigate these risks and improve pregnancy outcomes. The findings highlight the necessity of universal thyroid function screening protocols in antenatal care to ensure optimal maternal and perinatal health.

Keywords: IUGR, Hypothyroidism, Low birth weight, Preeclampsia, Preterm, TSH

INTRODUCTION

Hypothyroidism is one of the most common endocrine disorders during pregnancy, with significant implications for maternal health and fetal development. Thyroid hormones are essential for maintaining metabolic homeostasis, placental function, and fetal neurocognitive growth, especially in the early stages of gestation when the foetus is entirely dependent on maternal thyroid hormones.[1] Pregnancy itself alters thyroid physiology, increasing demands on the maternal thyroid gland, which may unmask or worsen hypothyroidism in predisposed individuals.[2]

Numerous studies have documented the adverse maternal outcomes associated with untreated or inadequately treated

hypothyroidism, including anaemia, gestational hypertension, preeclampsia, placental abruption, and increased risk of miscarriage.[3] The pathophysiological basis may involve altered vascular reactivity, endothelial dysfunction, and impaired placental development due to insufficient thyroid hormone support.[4,5] In addition, perinatal complications such as preterm delivery, intrauterine growth restriction, stillbirth, and low birth weight are consistently reported, along with potential long-term intellectual and neurodevelopmental deficits in offspring.[6,7]

The incidence of hypothyroidism in India is notably higher in women and increases with age. Overt hypothyroidism affects 3-4.5% of the general population, while subclinical hypothyroidism, which presents with elevated thyroid stimulating hormone (TSH) but normal thyroid hormone levels, impacts about 6.45-9% of individuals.[8] The risk factors for hypothyroidism encompass gender, age, autoimmune conditions, a history of thyroid dysfunction, and iodine scarcity.

Hospital-based retrospective studies are particularly valuable in assessing the prevalence, clinical profile, and maternal as well as perinatal outcomes of hypothyroidism among pregnant women. These studies provide region-specific data, often reflecting variations in nutritional iodine status, genetic predispositions, and healthcare practices. Such insights aid in identifying high-risk groups, optimizing screening strategies, and improving treatment protocols to reduce maternal and neonatal morbidity and mortality.[9]

In light of the high prevalence of thyroid disturbances in pregnancy and associated risk to mother and foetus this study was undertaken to evaluate the obstetric and perinatal implications among hypothyroid women and to compare with euthyroid mothers.

METHODS

Study design

This hospital based retrospective observational study was conducted in the department of obstetrics and gynecology St. Stephen's hospital Delhi among pregnant women in any trimester of pregnancy who attended the outpatient department, inpatient department and the labour ward of OBG, over a period of two years from 1st January 2022 to 31st December 2024. All pregnant women with single intrauterine gestation belonging to any trimester of pregnancy with known hypothyroidism with or without treatment were included in the study, while women with multiple pregnancies, gestational trophoblastic disease, bad obstetric history (BOH), previous thyroid surgery, patients who were on drugs affecting thyroid function like lithium, iodine or amiodarone were excluded from the study.

All data were retrieved from the maternity register, patient files and computerized hospital database. The following clinical information were collected: maternal age, gravida, parity, antenatal care (booked/unbooked), gestational age at delivery, birth weight and medical complications such as anaemia, preeclampsia/eclampsia, previous cesarean, intrauterine growth restriction and preterm premature rupture of membranes.

A total of 550 women were screened over the study period of two years. Informed consent waiver was taken due to retrospective nature of the study. Sample for TSH was collected from the fasting patients in red vacutainer (plain bulb) and then analyzed using the TOSOH AIA 360 immunoassay analyser (Tosoh India Pvt. Ltd., Mumbai, India). If serum TSH was abnormal, FT4 and free triiodothyronine (FT3) were estimated. The participants were grouped as patients with euthyroidism, overt hypothyroidism and subclinical hypothyroidism, according to their thyroid function results.

According to American Thyroid Association (ATA) guidelines 2017, the cut-off value for TSH was taken as 4.0 mIU/l in the present study. Women diagnosed with abnormal TSH FT4 and FT3 levels were tested and were referred to endocrinology clinic of our institution for a simultaneous treatment and follow up. Routine antepartum management was done and women were followed till delivery and perinatal period. In all newborns to the mothers a cord blood TSH level was done, and a TSH, FT4 was repeated after 72 hours.

Maternal parameters

Age, parity, thyroid status, associated comorbidities, mode of delivery, pregnancy complications (anaemia, gestational hypertension, preeclampsia, miscarriage). Perinatal parameters: gestational age at delivery, birth weight, APGAR scores, intrauterine growth restriction (IUGR), preterm delivery, stillbirth, and neonatal complications.

Statistical analysis

The data was compiled and coded on a Microsoft Excel spreadsheet. Data analysis was performed using Statistical Package for social sciences (SPSS) for Windows version 17.0 (SPSS Inc., Chicago, IL). The analysis included a comparison of outcomes between groups categorized as those with euthyroid and hypothyroid. Variables were evaluated using Pearson chi-squared test or ANOVA test, as appropriate. Pearson chi-squared test was used to analyse the relationship between two categorical variables, for example, mode of delivery in women with hypothyroidism and euthyroidism. Odds ratio was calculated for clinical significance and the p value was calculated for each parameter with $p<0.05$ was considered as statistically significant.

Approval for the study was obtained from the institutional ethics committee. Patient confidentiality was maintained throughout, and records were anonymized prior to analysis.

RESULTS

Out of the 550 patients (100%), 480 (87.27%) were classified with euthyroid and 70 (12.72%) with hypothyroidism. Forty-nine patients (8.9%) had subclinical hypothyroidism whereas 21 (3.81%) had overt hypothyroidism (Table 1).

Table 1: Distribution of cases according to prevalence.

Number of cases	Frequency (%)
Euthyroid	480 (87.27)
Sub clinical hypothyroidism	49 (8.9)
Overt hypothyroidism	21 (3.81)
Total (N)	550 (100)

Table 2: Mean values of TSH, FT4 and TSH among groups.

Thyroid status	Mean TSH (mIU/L)	Mean FT4 (ng/dl)	Mean FT3 (pg/ml)
Euthyroid	2.88±1.22	1.36±0.56	3.22±0.66
Subclinical hypothyroidism	6.52±1.66	1.22±0.34	2.88±0.46
Overt hypothyroidism	11.46±2.82	0.48±0.24	1.26±0.36

Table 3: Analysis of obstetrical parameters of the pregnant women with or without thyroid disorders.

Parameters	Euthyroid (%)	Hypothyroid (%)	Chi square	P value
	n=480	n=70		
Age	27.50±3.21 years	28.92±2.83 years	2.56	0.756
Parity				
Primigravida	296 (61.6)	28 (40)	10.97	0.001
Multigravida	184 (38.4)	42 (60)		
Gestational age at delivery			5.66	0.059
<37weeks (pre term)	36 (7.5)	11 (15.7)		
37-40 weeks (term)	436 (90.34)	58 (82.8)		
>40 weeks (post term	8 (1.66)	2 (2.85)		
Booking status			0.18	0.674
Booked	348 (72.5)	53 (75.7)		
Unbooked	132 (27.5)	17 (24.3)		

Table 4: Comparison of maternal outcomes in hypothyroid versus euthyroid mothers.

Maternal outcome	Hypothyroid (n=70)	Euthyroid (n=480)	Odds ratio 95% CI	P value
Anaemia	27.20%	11.50%	2.88 (1.58-5.23)	0.0003
Preeclampsia	12.85%	4.36%	3.22 (1.41-7.36)	0.0035
Miscarriage	11.44%	2.36%	5.5 (2.13-14.20)	0.0001
PPROM	11.44%	3.75%	3.31 (1.38-7.94)	0.0047
PPH	7.14%	4.6%	1.63 (0.59-4.45)	0.338
MSL	8.57%	6.25%	1.41 (0.56-3.51)	0.463
Caesarean delivery	62.86%	35.44%	4.84 (2.66-12.20)	0.0001

Table 5: Comparison of perinatal outcomes in hypothyroid versus euthyroid mothers.

Perinatal outcome	Hypothyroid (n=70)	Euthyroid (n=480)	Odds ratio 95% CI	P value
Preterm delivery	21.42%	7.50%	3.36 (1.73-6.54)	0.0002
Low birth weight (<2.5 kg)	28.60%	9.16%	3.96 (2.17-7.25)	<0.0001
IUGR	15.70%	6.87%	2.53 (1.21-5.26)	0.011
Fetal distress	25.7%	7.5%	4.27 (2.26-8.05)	<0.0001
NICU admission	22.8%	5.4%	5.17 (2.61-10.25)	<0.0001
Stillbirth	4.30%	1.25%	3.49 (0.85-14.29)	0.0644
APGAR <7 at 5 minutes	22.8%	8.80%	3.09 (1.63-5.87)	0.0003

Mean serum TSH levels among women among euthyroid, sub-clinical hypothyroidism and overt hypothyroidism were 2.88±1.22 mIU/ml, 6.52±1.66 mIU/ml, 11.46±2.82 mIU/ml respectively.

Mean serum FT4 levels among women with euthyroid, sub-clinical hypothyroidism and overt hypothyroidism were 1.36±0.56, 1.22±0.34 ng/dl and 0.48±0.24 ng/dl respectively. Mean serum FT3 levels among women with euthyroid, sub-clinical hypothyroidism and overt hypothyroidism were 3.22±0.66, 2.88±0.46 pg/ml and 1.26±0.36 pg/ml respectively (Table 2).

Forty-two patients (60%) multigravida and 28 (40%) primigravida patients were diagnosed with hypothyroidism. There was a higher incidence of hypothyroidism in multigravida patients in the present study. The majority of patients with euthyroidism (61.66%) were primigravida (Table 3). Mean age was 27.50±3.21 in euthyroid and 28.92±2.83 years in hypothyroid group with no significant difference. Similarly, no difference was found in regard to booking status and gestational age at delivery, whereas hypothyroidism was significantly higher among multigravida females.

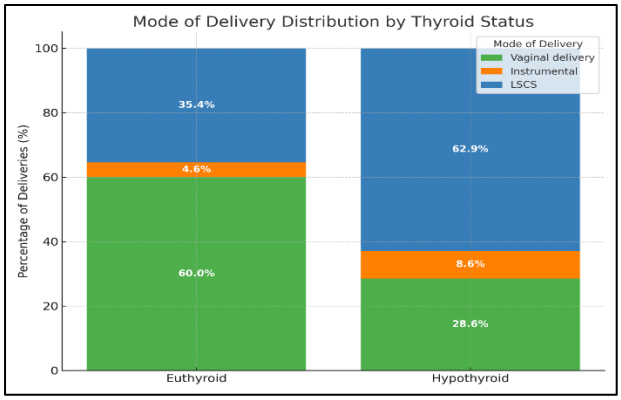

Figure 1: Mode of delivery among women with hypothyroidism and euthyroidism.

Forty-four (62.86%) out of the 70 patients with hypothyroidism underwent lower segment cesarean section (LSCS), while twenty-six (37.14%) had a vaginal delivery (20 normal and 6 instrumental vaginal). In contrast, among the women with euthyroidism, majority of them i.e. 310 (64.58%) had normal vaginal deliveries, whereas 170 (35.42%) undergoing LSCS (Figure 1). The reasons for LSCS in the patients with hypothyroidism included preeclampsia, preterm labour, GDM, gestational hypertension, and fetal distress. This indicates a higher rate of LSCS in women with hypothyroidism compared to those with euthyroidism.

Analysis of obstetrical parameters (Table 3) showed a statistically significant difference in parity between the two groups (χ^2=10.97, p=0.001), with a higher proportion of multigravida women in the hypothyroid group (60.0%) compared to the euthyroid group (38.4%). The difference in gestational age at delivery between the groups approached significance (χ^2=5.66, p=0.0590), with preterm births occurring more frequently among hypothyroid women (15.7%) than euthyroid women (7.5%). Booking status did not differ significantly between the groups (p=0.6735). A highly significant difference was observed in the mode of delivery (χ^2=24.51, p<0.0001), with the hypothyroid group having a markedly higher proportion of LSCS deliveries (62.86%) compared to the euthyroid group (35.4%). Vaginal deliveries were correspondingly less frequent among hypothyroid women (28.57% versus 60.0%), while instrumental deliveries were slightly more common (8.57% versus 4.58%).

The comparison of maternal complications between euthyroid and hypothyroid women revealed several statistically significant differences (Table 4). Anaemia was significantly more common among hypothyroid women (27.2%) compared to euthyroid women (11.5%), with an odds ratio (OR) of 2.88 (95% CI: 1.58-5.23, p=0.0003). Preterm labour occurred in 21.42% of hypothyroid women versus 7.5% of euthyroid women, corresponding to an OR of 3.36 (95% CI: 1.73-6.54, p=0.0002). Similarly, pre-eclampsia was more prevalent in the hypothyroid group (12.85% versus 4.36%), with an OR of 3.22 (95% CI: 1.41-7.36, p=0.0035).

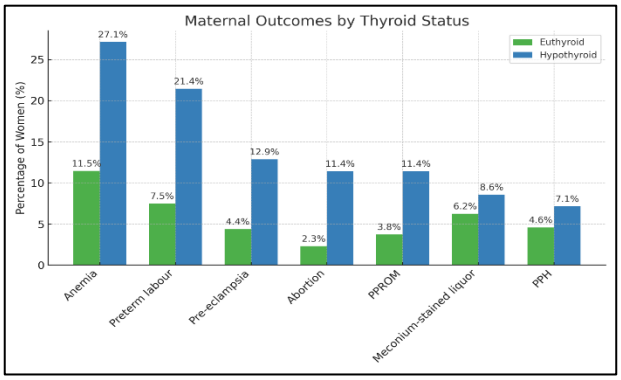

Figure 2: Comparison of maternal outcomes among euthyroid and hypothyroid women.

A particularly strong association was observed for abortion, which occurred in 11.44% of hypothyroid women compared to 2.3% of euthyroid women (OR=5.50, 95% CI: 2.13-14.20, p=0.0001). Preterm premature rupture of membranes (PPROM) was also significantly higher among hypothyroid women (11.44% versus 3.75%, OR=3.31, 95% CI: 1.38-7.94, p=0.0047).

On the other hand, meconium-stained liquor and post-partum hemorrhage (PPH) did not show statistically significant differences between the two groups (p=0.4632 and p=0.3388, respectively). These findings suggest that hypothyroidism during pregnancy is associated with a substantially higher risk of several key maternal complications, particularly anemia, preterm labour, pre-eclampsia, abortion, and PPROM (Figure 2).

Comparison of fetal outcomes between euthyroid and hypothyroid women showed several statistically significant differences (Table 5). Low birth weight was markedly higher among hypothyroid mothers (28.6%) compared to euthyroid mothers (9.16%), with an odds ratio (OR) of 3.96 (95% CI: 2.17-7.25, p<0.0001). Intrauterine growth restriction (IUGR) was also more prevalent in the hypothyroid group (15.7% versus 6.87%; OR=2.53, 95% CI: 1.21-5.26, p=0.0109). Similarly, fetal distress occurred more frequently among hypothyroid women (25.7% versus 7.5%; OR=4.27, 95% CI: 2.26-8.05, p<0.0001), as did NICU admissions (22.8% versus 5.4%; OR=5.17, 95% CI: 2.61-10.25, p<0.0001). A low Apgar score at 5 minutes (<7) was also significantly more common in infants born to hypothyroid mothers (22.8% versus 8.8%; OR=3.09, 95% CI: 1.63-5.87, p=0.0003).

In contrast, the incidence of intrauterine death (IUD) and neonatal death did not differ significantly between groups (4.3% versus 1.25%; OR=3.49, 95% CI: 0.85-14.29, p=0.0644). These findings highlight that hypothyroidism during pregnancy is associated with a significantly elevated risk of multiple adverse neonatal outcomes, particularly low birth weight, growth restriction, intrapartum distress, and immediate postnatal morbidity requiring NICU care (Figure 3).

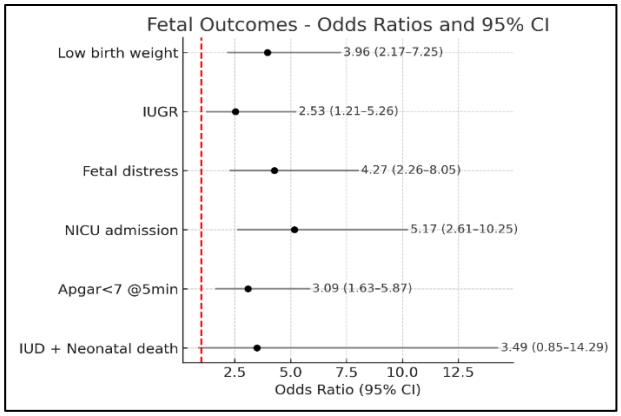

Figure 3: Comparison of fetal outcomes among euthyroid and hypothyroid women.

DISCUSSION

This hospital-based retrospective study confirms that hypothyroidism in pregnancy is an important determinant of both maternal and perinatal outcomes. The analysis revealed a higher incidence of complications such as preeclampsia, gestational hypertension, anaemia, and increased rates of cesarean section among hypothyroid mothers when compared to their euthyroid counterparts. These findings suggest that inadequate thyroid hormone availability contributes to vascular and metabolic disturbances, which in turn increase obstetric risks.

The study's findings are consistent with earlier investigations across different populations, which reported that both overt and subclinical hypothyroidism are associated with adverse maternal and neonatal outcomes. The relatively higher prevalence of subclinical hypothyroidism identified in this study supports the growing recognition that even mild thyroid dysfunction is not benign during pregnancy.[10]

In terms of obstetric outcomes, pre-eclampsia was observed in 15.8% of women (p=0.041) with hypothyroidism which was comparable to previous studies, in which pre-eclampsia was seen in 13.6% women with sub-clinical hypothyroidism and 14.7 in overt hypothyroidism.[11] Hypothyroidism causes vascular smooth muscle contraction both in systemic and renal vessels, which leads to increased diastolic pressure, peripheral vascular resistance, and decreased tissue perfusion, which could be the pathophysiology of preeclampsia in hypothyroidism.[12] Increased rate of cesarean delivery is another outcome, observed in 26.7% (p=0.012) of women with hypothyroidism. Other authors have reported rates of cesarean delivery of 22.9% in women with hypothyroidism.[12] Miscarriage was observed in 11% of hypothyroid women when compared to 2.3% among euthyroid and the findings were similar to previous study by Twig et al who observed increased rates of recurrent pregnancy loss and infertility among hypothyroid women.[13,14]

In terms of neonatal outcomes, infants born to hypothyroid mothers exhibited greater vulnerability to preterm birth, low birth weight, growth restriction, and stillbirth. Such outcomes can be explained by impaired placental function and altered intrauterine environment resulting from thyroid hormone insufficiency. LBW was observed in 28.6% of women with hypothyroidism, that was close to 20% observed in another study.[15] Reduced fetal thyroxine may cause disruption to the development of the pituitary-thyroid axis of the newborn, fetal pituitary growth hormone secretion, vascular responsiveness and maturation, and cardiovascular homeostasis in utero.[14] Increased rate of fetal distress and NICU admission was seen among hypothyroid patients in 25.7 and 22.8% respectively, which is similar to the rates of 26.6 and 22% in a study by Haddock et al and Sreelatha et al.[15,16] Low Apgar scores occurred in 22.8% of babies born to women with hypothyroidism women and results were also consistent with previous studies.[16]

This is a retrospective observational study, so recall bias is possible as data were gathered from the medical files. As the data came from a single hospital, the conclusions inferred may not be applicable to the entire population of the country. Furthermore, factors such as nutritional status, socioeconomic background and adherence to treatment were not fully assessed. Despite these limitations, our findings are consistent with the earlier literature and contribute to the growing evidence that maternal hypothyroidism is a significant but modifiable risk factor for adverse pregnancy outcomes

CONCLUSION

Hypothyroidism in pregnancy poses a significant risk to both maternal well-being and perinatal health outcomes. The findings of this hospital-based retrospective study reaffirm the associations between hypothyroidism and adverse maternal complications such as preeclampsia, gestational hypertension, and increased cesarean deliveries, as well as perinatal consequences including preterm birth, low birth weight, fetal distress and high NICU admission rates.

Early diagnosis, adequate levothyroxine therapy, and vigilant antenatal monitoring remain the cornerstone strategies for mitigating risks. Future prospective, large-scale multicentre studies are warranted to establish universally applicable screening guidelines and optimize evidence-based clinical practices.

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