

Research Article

Maternal and Perinatal Outcomes in Pregnant Women with Hypothyroidism: A Comparative Study at a Tertiary Care Center

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ABSTRACT

Background: Hypothyroidism is one of the most common endocrine disorders encountered during pregnancy and is associated with several maternal and fetal complications. Early identification and management are essential to improve pregnancy outcomes.

Aim: To evaluate the impact of maternal hypothyroidism on maternal and fetal outcomes in comparison with euthyroid pregnant women attending a tertiary care center.

Materials and Methods: This hospital-based comparative observational study was conducted among 60 pregnant women admitted to a tertiary care hospital. The study population included 30 hypothyroid pregnant women and 30 euthyroid pregnant women selected based on predefined inclusion and exclusion criteria. Detailed clinical history, obstetric profile, thyroid function status, maternal complications, and fetal outcomes were recorded using a structured proforma. Maternal outcomes such as anemia, gestational hypertension, preeclampsia, gestational diabetes mellitus, preterm labor, and mode of delivery were assessed. Fetal outcomes including low birth weight, preterm birth, fetal distress, APGAR score, NICU admission, and intrauterine fetal death were evaluated. Data were analyzed using SPSS version 25.0, and a p-value <0.05 was considered statistically significant.

Results: Maternal complications such as anemia (46.7%) and preterm labor (30.0%) were significantly higher among hypothyroid mothers compared to euthyroid women. Cesarean section was more common in the hypothyroid group (50.0%). Fetal complications including low birth weight (36.7%) and NICU admission (30.0%) were also significantly increased among hypothyroid pregnancies. Overall adverse pregnancy outcomes were significantly associated with maternal hypothyroidism (p=0.01).

Conclusion: Maternal hypothyroidism is associated with increased maternal and fetal morbidity. Routine antenatal thyroid screening and timely management may help reduce adverse pregnancy outcomes.

Keywords: Hypothyroidism, Pregnancy, Maternal Outcomes, Fetal Outcomes, Low Birth Weight, NICU Admission, Thyroid Dysfunction.

INTRODUCTION

Thyroid disorders are among the most common endocrine abnormalities encountered during pregnancy, with hypothyroidism being a significant contributor to maternal and fetal morbidity. Pregnancy induces profound physiological changes in thyroid function due to increased levels of human chorionic gonadotropin, elevated estrogen concentrations, and enhanced renal iodine clearance^[1]. Adequate maternal thyroid hormone levels are essential for normal fetal growth and neurodevelopment, particularly

during the first trimester when the fetus is entirely dependent on maternal thyroxine supply. Impaired thyroid function during pregnancy can therefore adversely affect both maternal health and fetal outcomes^[2].

Hypothyroidism during pregnancy may be overt or subclinical and is characterized by elevated serum thyroid-stimulating hormone (TSH) levels with or without reduced free thyroxine levels. The prevalence of hypothyroidism in pregnancy varies geographically depending on iodine sufficiency, ethnicity, and diagnostic criteria^[3]. Globally, overt hypothyroidism affects

approximately 0.3–0.5% of pregnancies, whereas subclinical hypothyroidism is reported in 2–5% of pregnant women. In India, the prevalence has been found to be comparatively higher, ranging from 4% to 11%, making it an important public health concern. Increased awareness and routine antenatal thyroid screening have led to greater detection of thyroid dysfunction in recent years^[4].

Several studies have demonstrated a strong association between maternal hypothyroidism and adverse obstetric outcomes. Maternal complications commonly reported include anemia, gestational hypertension, preeclampsia, placental abruption, postpartum hemorrhage, and increased cesarean delivery rates. Fetal and neonatal complications include spontaneous abortion, preterm birth, low birth weight, fetal distress, intrauterine growth restriction, stillbirth, and neonatal intensive care unit admission. Sahu et al^[5]. observed significantly higher maternal and fetal complications among hypothyroid pregnant women compared to euthyroid mothers. Similarly, Leung et al^[3]. reported increased rates of preeclampsia and low birth weight in women with untreated hypothyroidism. Allan et al^[6]. also identified an increased risk of fetal loss and premature delivery associated with elevated maternal TSH levels.

Despite the availability of evidence linking hypothyroidism with adverse pregnancy outcomes, variations exist in the reported prevalence and severity of complications across different populations^[7]. Early diagnosis and prompt treatment can substantially improve maternal and neonatal prognosis. However, hypothyroidism often remains underdiagnosed due to nonspecific clinical manifestations during pregnancy. In resource-limited settings, routine thyroid screening is not uniformly practiced, leading to delayed identification and management.

Considering the growing burden of thyroid dysfunction among pregnant women and its preventable complications, the present study was undertaken to evaluate the impact of maternal hypothyroidism on maternal and fetal outcomes in comparison with euthyroid pregnancies at a tertiary care center. The findings of this study may contribute to improved antenatal surveillance and timely intervention strategies aimed at reducing adverse pregnancy outcomes.

Aim and Objectives

Aim of the Study

To evaluate the impact of maternal hypothyroidism on maternal and fetal outcomes among pregnant women attending a tertiary care center.

Objectives of the Study

1. To compare the maternal complications such as anemia, preeclampsia, gestational hypertension, gestational diabetes mellitus, and mode of delivery between hypothyroid and euthyroid pregnant women.
2. To assess fetal and neonatal outcomes including preterm birth, low birth weight, NICU admission, fetal distress, and perinatal mortality among the study groups.
3. To determine the association between maternal hypothyroidism and adverse pregnancy outcomes in comparison with euthyroid pregnancies.

MATERIALS AND METHODS

Study Design and Setting

This hospital-based comparative observational study was conducted in the Department of Obstetrics and Gynecology at a tertiary care teaching hospital over a period of one year. The study was designed to evaluate and compare maternal and fetal outcomes among pregnant women with hypothyroidism and euthyroid pregnant women.

Study Population

Pregnant women attending the antenatal outpatient department and admitted to the labor ward during the study period were screened for eligibility. Eligible participants were categorized into two groups:

- **Cases:** Pregnant women diagnosed with hypothyroidism
- **Controls:** Euthyroid pregnant women matched for gestational age and maternal age

Sample Size Calculation

The sample size was calculated using the formula for comparison of two proportions:

$$n = \frac{(Z_{\alpha/2} + Z_{\beta})^2 [P_1(1 - P_1) + P_2(1 - P_2)]}{(P_1 - P_2)^2}$$

Where:

- n = required sample size in each group
- $Z_{\alpha/2}$ = 1.96 for 95% confidence interval
- Z_{β} = 0.84 for 80% study power
- P_1 = expected proportion of adverse fetal outcomes among hypothyroid mothers
- P_2 = expected proportion among euthyroid mothers

The prevalence estimates were derived from the study by Sahu MT et al., which reported adverse fetal outcomes in 40% of hypothyroid pregnancies and 15% of euthyroid pregnancies. Substituting the values:

$$n = \frac{(1.96 + 0.84)^2 [(0.40)(0.60) + (0.15)(0.85)]}{(0.40 - 0.15)^2}$$

The calculated minimum sample size was approximately 46 participants in each group. However, due to the limited duration of the study and feasibility considerations, a convenient sample size of 30 participants in each group was included.

Thus, the total sample size was:

- **Cases (Hypothyroid mothers): 30**
- **Controls (Euthyroid mothers): 30**
- Total sample size = 60 participants**

Inclusion Criteria

1. Pregnant women aged between 18 and 40 years
2. Singleton pregnancy
3. Gestational age more than 20 weeks
4. Women diagnosed with hypothyroidism based on thyroid profile during pregnancy
5. Women willing to participate and provide informed consent

Exclusion Criteria

1. Pregnant women with pre-existing diabetes mellitus or chronic hypertension
2. Multiple pregnancies
3. Known renal, hepatic, or cardiac disorders
4. Autoimmune disorders other than thyroid disease
5. Pregnancies complicated by congenital fetal anomalies
6. Women unwilling to participate in the study

Data Collection Procedure

Eligible pregnant women fulfilling the inclusion criteria were enrolled after obtaining written informed consent. Detailed demographic information, obstetric history, menstrual history, and medical history were recorded using a predesigned structured proforma.

Clinical examination including general physical examination and obstetric examination was performed. Relevant laboratory investigations such as hemoglobin estimation, blood sugar levels, urine analysis, and thyroid function tests including serum thyroid-stimulating hormone (TSH), free T3, and free T4 were documented. Participants diagnosed with hypothyroidism were managed according to institutional

treatment protocols and followed up throughout pregnancy until delivery.

Outcome Measures

Maternal Outcomes

The following maternal outcomes were assessed:

- Anemia
- Gestational hypertension
- Preeclampsia
- Gestational diabetes mellitus
- Preterm labor
- Premature rupture of membranes
- Mode of delivery
- Postpartum hemorrhage

Fetal and Neonatal Outcomes

The fetal and neonatal parameters evaluated included:

- Birth weight
- Low birth weight (<2.5 kg)
- Preterm birth
- Fetal distress
- APGAR score at 5 minutes
- NICU admission
- Intrauterine fetal death
- Neonatal complications

Statistical Analysis

Data were entered in Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS) software version 25.0. Continuous variables were expressed as mean $\pm$ standard deviation, while categorical variables were expressed as frequencies and percentages.

The Chi-square test or Fisher's exact test was used for comparison of categorical variables between groups. Independent Student's t-test was used for comparison of continuous variables. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations

The study was conducted after obtaining approval from the Institutional Ethics Committee. Written informed consent was obtained from all participants prior to enrollment. Confidentiality of participant information was maintained throughout the study.

RESULTS

A total of 60 pregnant women were included in the study, comprising 30 hypothyroid pregnant women (cases) and 30 euthyroid pregnant women (controls). Maternal demographic characteristics, maternal complications, and

fetal outcomes were compared between the two groups.

Table 1. Distribution of Study Participants According To Maternal Demographic Characteristics

Variables	Hypothyroid Group (n=30)	Euthyroid Group (n=30)	p-value
Mean age (years)	27.8 ± 4.2	26.9 ± 3.8	0.39
Primigravida	16 (53.3%)	14 (46.7%)	0.60
Multigravida	14 (46.7%)	16 (53.3%)	
Mean gestational age at delivery (weeks)	37.1 ± 2.1	38.2 ± 1.4	0.02*
Booked cases	24 (80.0%)	26 (86.7%)	0.48
Unbooked cases	6 (20.0%)	4 (13.3%)	

*Statistically significant

Table 2. Comparison of Maternal Complications between the Study Groups

Maternal Complications	Hypothyroid Group (n=30)	Euthyroid Group (n=30)	p-value
Anemia	14 (46.7%)	7 (23.3%)	0.05*
Gestational hypertension	8 (26.7%)	3 (10.0%)	0.09
Preeclampsia	7 (23.3%)	2 (6.7%)	0.07
Gestational diabetes mellitus	6 (20.0%)	2 (6.7%)	0.12
Preterm labor	9 (30.0%)	3 (10.0%)	0.04*
Premature rupture of membranes	5 (16.7%)	2 (6.7%)	0.22

*Statistically significant

Table 3. Comparison of Mode of Delivery among the Study Groups

Mode of Delivery	Hypothyroid Group (n=30)	Euthyroid Group (n=30)	p-value
Normal vaginal delivery	14 (46.7%)	21 (70.0%)	0.04*
Cesarean section	15 (50.0%)	8 (26.7%)	
Instrumental delivery	1 (3.3%)	1 (3.3%)	

*Statistically significant

Table 4. Comparison of Fetal and Neonatal Outcomes between the Study Groups

Fetal and Neonatal Outcomes	Hypothyroid Group (n=30)	Euthyroid Group (n=30)	p-value
Low birth weight (<2.5 kg)	11 (36.7%)	4 (13.3%)	0.03*
Preterm birth	8 (26.7%)	3 (10.0%)	0.09
Fetal distress	7 (23.3%)	2 (6.7%)	0.07
APGAR score <7 at 5 min	6 (20.0%)	2 (6.7%)	0.12
NICU admission	9 (30.0%)	3 (10.0%)	0.04*
Intrauterine fetal death	1 (3.3%)	0 (0%)	0.31

*Statistically significant

Table 5. Association between Maternal Hypothyroidism and Adverse Pregnancy Outcome

Adverse Pregnancy Outcome	Hypothyroid Group (n=30)	Euthyroid Group (n=30)	Odds Ratio (95% CI)	p-value
Presence of any adverse outcome	19 (63.3%)	9 (30.0%)	4.03 (1.35–12.01)	0.01*
No adverse outcome	11 (36.7%)	21 (70.0%)		

*Statistically significant

DISCUSSION

The present comparative study evaluated the impact of maternal hypothyroidism on maternal

and fetal outcomes among pregnant women attending a tertiary care center. In this study, hypothyroid pregnant women demonstrated a

significantly higher incidence of adverse maternal and neonatal outcomes compared to euthyroid women, emphasizing the importance of early diagnosis and treatment during pregnancy.

In the present study, the mean maternal age among hypothyroid women was 27.8 ± 4.2 years, which was comparable to the euthyroid group. Similar observations were reported by Sahu et al., who found no significant difference in maternal age distribution between hypothyroid and euthyroid pregnant women, indicating that thyroid dysfunction can affect women across all reproductive age groups irrespective of age differences^[5].

Anemia was observed in 46.7% of hypothyroid mothers in the present study, significantly higher than the control group. Thyroid hormones play an important role in erythropoiesis, and hypothyroidism has been associated with reduced red blood cell production. Similar findings were reported by Muthulakshmi et al., who demonstrated a higher prevalence of anemia among hypothyroid pregnant women^[8].

The incidence of gestational hypertension and preeclampsia was higher among hypothyroid mothers in the current study. Although the association did not reach strong statistical significance for all hypertensive disorders, the trend was consistent with previous literature. Leung et al. reported increased rates of pregnancy-induced hypertension and preeclampsia among women with hypothyroidism^[3]. Casey et al. also observed that subclinical hypothyroidism was associated with increased obstetric complications, particularly hypertensive disorders^[7].

Preterm labor occurred more frequently in hypothyroid pregnancies in the present study. Similar findings were documented by Allan et al., who reported an increased risk of premature delivery among women with elevated TSH levels during pregnancy^[6]. Thyroid hormone deficiency may impair placental function and fetal growth, thereby contributing to preterm birth.

Cesarean section was significantly more common among hypothyroid women in this study. This may be related to increased obstetric complications such as fetal distress, preeclampsia, and failed induction. Sahu et al. similarly observed higher operative delivery rates among hypothyroid mothers compared to euthyroid controls^[5].

Among fetal outcomes, low birth weight and NICU admission were significantly higher in the

hypothyroid group. These findings are comparable to those reported by Dhanwal et al., who identified increased rates of low birth weight and neonatal morbidity among pregnancies complicated by hypothyroidism.^[9] Leung et al. also reported higher frequencies of fetal distress and neonatal complications in hypothyroid mothers.^[3]

The present study additionally found a higher occurrence of fetal distress, low APGAR scores, and intrauterine fetal death among hypothyroid pregnancies, although some outcomes did not achieve statistical significance due to the relatively small sample size. Similar trends have been reported in previous studies, supporting the association between maternal thyroid dysfunction and poor perinatal outcomes.^[1,10]

Overall, the findings of the present study are in agreement with earlier research demonstrating that maternal hypothyroidism adversely affects both maternal and fetal health. Early antenatal screening, regular monitoring of thyroid function, and appropriate thyroxine supplementation may help reduce these complications and improve pregnancy outcomes.

Limitations

The study was conducted with a relatively small sample size and at a single tertiary care center, which may limit the generalizability of the findings. Long-term neonatal follow-up and assessment of neurodevelopmental outcomes were not included. In addition, differentiation between overt and subclinical hypothyroidism was not analyzed separately, which could influence the severity of outcomes observed.

CONCLUSION

Maternal hypothyroidism was found to be significantly associated with adverse maternal and fetal outcomes, including anemia, preterm labor, increased cesarean section rates, low birth weight, and higher NICU admissions. The study highlights the importance of early antenatal screening, timely diagnosis, and appropriate management of hypothyroidism during pregnancy to improve both maternal and neonatal outcomes. Routine thyroid function assessment during pregnancy may help in reducing preventable obstetric and neonatal complications.

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