



Effect of maternal hypothyroidism during pregnancy on obstetric outcomes, fetal growth, birth weight, and early neonatal morbidity: a prospective observational study.

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Abstract

Background: Maternal hypothyroidism is an important endocrine disorder during pregnancy and may be associated with adverse obstetric, fetal, and neonatal outcomes. **Objective:** To evaluate the association of maternal hypothyroidism during pregnancy with obstetric outcomes, fetal growth, birth weight, and early neonatal morbidity. **Materials and Methods:** A prospective observational study was conducted in the Department of Obstetrics and Gynaecology at KLE JGMM Medical College and Hospital, Hubli, over 6 months. A total of 50 pregnant women diagnosed with hypothyroidism during pregnancy were enrolled and followed until delivery. Maternal obstetric outcomes, gestational age at delivery, fetal growth, birth weight, early neonatal morbidity, and NICU admission were assessed. Data were analysed using appropriate descriptive and inferential statistical methods, with $p < 0.05$ considered statistically significant. **Results:** Among the 50 participants, 40% were aged 25–29 years and 56% were multigravida. Hypothyroidism was diagnosed during the first, second, and third trimesters in 36%, 48%, and 16% of women, respectively. Preterm delivery occurred in 16% of pregnancies, while caesarean delivery was performed in 44%. Gestational hypertension/preeclampsia and gestational diabetes mellitus were documented in 14% and 10% of women, respectively. Among the newborns, 20% had low birth weight and 14% were small for gestational age. Early neonatal morbidity was observed in 24%, and 18% required NICU admission. **Conclusion:** Maternal hypothyroidism during pregnancy was associated with clinically relevant obstetric and neonatal outcomes, including preterm delivery, low birth weight, fetal growth abnormalities, early neonatal morbidity, and NICU admission. Early diagnosis, appropriate treatment, and regular maternal and fetal surveillance are important for optimizing pregnancy and neonatal outcomes.

Keywords: Maternal hypothyroidism; Pregnancy; Obstetric outcomes; Fetal growth; Birth weight; Preterm birth; Low birth weight; Neonatal morbidity; NICU admission.



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INTRODUCTION

Maternal thyroid dysfunction is an important endocrine disorder during pregnancy, as pregnancy produces substantial physiological changes in thyroid function and increases the requirement for thyroid hormone. Maternal hypothyroidism may be overt or subclinical and can be influenced by iodine status, autoimmune thyroid disease, and pre-existing thyroid dysfunction. Appropriate diagnosis and treatment during pregnancy are therefore important for maintaining maternal health and supporting normal fetal development. Current American Thyroid Association recommendations emphasize pregnancy-specific assessment of thyroid function and appropriate levothyroxine therapy when indicated. [1,2]

Thyroid hormones have an important role in placental function, fetal growth, and maturation of multiple fetal organ systems. Maternal hypothyroidism has been associated with several adverse pregnancy outcomes, including miscarriage, hypertensive disorders, gestational diabetes mellitus, preterm birth, and abnormalities of fetal growth. Evidence from large systematic reviews and meta-analyses suggests that thyroid dysfunction during pregnancy is associated with a broad range of adverse maternal and offspring outcomes, although the magnitude of risk varies according to the type and severity of thyroid dysfunction. [3,4]

Preterm birth is one of the important neonatal outcomes reported in association with maternal hypothyroidism. A systematic review and meta-analysis involving more than two million pregnancies found a modest but significant association between

overt maternal hypothyroidism and preterm delivery. Other meta-analytic evidence has also demonstrated increased risks of preterm birth among women with clinical and subclinical hypothyroidism. [5,6]

Maternal thyroid dysfunction may also influence fetal growth and birth weight. Previous evidence has reported associations between maternal hypothyroidism and low birth weight, altered birth weight, and other abnormalities of fetal growth. A systematic review of neonatal outcomes found a tendency toward increased low birth weight and preterm birth among offspring of mothers with hypothyroidism, although results for small-for-gestational-age status have been less consistent. [7] Maternal hypothyroidism has additionally been investigated in relation to obstetric complications such as gestational hypertension, preeclampsia, and gestational diabetes mellitus. Individual-participant data meta-analysis has demonstrated an association between subclinical hypothyroidism and preeclampsia, while other systematic reviews have reported an increased risk of gestational diabetes in women with subclinical hypothyroidism. [4,8]

Neonatal consequences are clinically relevant because prematurity, low birth weight, fetal growth abnormalities, and neonatal complications may increase the need for specialized neonatal care. Recent Indian evidence has reported substantial pooled frequencies of preterm birth and low birth weight among pregnancies complicated by hypothyroidism, highlighting the importance of appropriate recognition and management in the Indian clinical setting. [9] Despite the available evidence, outcomes may vary according to the timing of diagnosis, severity of hypothyroidism, treatment status, maternal characteristics, and obstetric care. Therefore, the present prospective observational study was undertaken to evaluate obstetric outcomes, fetal growth, birth weight, and early neonatal morbidity among pregnant women with hypothyroidism at KLE JGMM Medical College and Hospital, Hubli.

MATERIALS AND METHODS

Study Design and Setting

A prospective observational study was conducted in the Department of Obstetrics and Gynaecology at KLE JGMM Medical College and Hospital, Hubli, over 6 months. The study was designed to evaluate the effect of maternal hypothyroidism during pregnancy on obstetric outcomes, fetal growth, birth weight, and early neonatal morbidity.

Study Population

The study included pregnant women diagnosed with hypothyroidism during pregnancy who attended the Department of Obstetrics and Gynaecology during the study period. A total of 50 pregnant women fulfilling the eligibility criteria were enrolled and followed prospectively until delivery. Their newborns were subsequently assessed for birth weight, fetal growth-related parameters, and early neonatal morbidity.

Inclusion Criteria

Pregnant women were included if they:

- Were diagnosed with hypothyroidism during pregnancy according to institutional diagnostic criteria.
- Attended the Department of Obstetrics and Gynaecology during the study period.
- Continued pregnancy and delivered at the study institution.
- Had adequate maternal and neonatal records available for assessment.
- Provided informed consent to participate in the study.

Exclusion Criteria

Women were excluded if they:

- Had significant pre-existing medical disorders likely to independently affect pregnancy or neonatal outcomes.
- Had incomplete maternal or neonatal records.
- Did not provide informed consent.
- Were lost to follow-up before delivery.

Data Collection

After enrolment, relevant maternal demographic and obstetric information was recorded using a structured data collection proforma. Maternal variables included age, obstetric history, gestational age at diagnosis of hypothyroidism, and relevant clinical and laboratory findings available in the medical records. The participants were followed prospectively throughout pregnancy. Details regarding antenatal course, obstetric complications, mode of delivery, and gestational age at delivery were recorded.

Assessment of Obstetric Outcomes

The obstetric outcomes assessed included gestational age at delivery, preterm delivery, mode of delivery, and pregnancy-related complications documented during the antenatal and intrapartum periods. Preterm birth was defined as delivery before 37 completed weeks of gestation.

Assessment of Fetal Growth and Birth Weight

Fetal growth was assessed using available antenatal clinical and ultrasonographic findings. Birth weight was recorded immediately after delivery using the standard weighing equipment available in the labour room/neonatal area. Low birth weight was defined as a birth weight of less than 2.5 kg.

Assessment of Early Neonatal Morbidity

Newborns were assessed during the early neonatal period for clinically documented morbidity. Relevant neonatal parameters, including gestational age, birth weight, and early neonatal complications, were recorded. The requirement for neonatal observation, specialised neonatal care, or admission to the neonatal intensive care unit (NICU), when applicable, was also documented.

Outcome Measures

The primary outcomes of the study were:

1. Obstetric outcomes associated with maternal hypothyroidism.
2. Fetal growth abnormalities.
3. Birth weight and occurrence of low birth weight.
4. Early neonatal morbidity.

Secondary observations included gestational age at delivery, mode of delivery, and other clinically documented maternal or neonatal complications.

Statistical Analysis

Data collected from the study participants were entered into a suitable database and analysed using appropriate statistical methods. Continuous variables were expressed as mean $\pm$ standard deviation, while categorical variables were presented as frequencies and percentages. Appropriate statistical tests were used to assess associations between maternal hypothyroidism and the recorded obstetric, fetal, and neonatal outcomes. A p-value <0.05 was considered statistically significant.

RESULTS

The present prospective observational study was conducted in the Department of Obstetrics and Gynaecology, KLE JGMM Medical College and Hospital, Hubli, over a period of 6 months. A total of 50 pregnant women with maternal hypothyroidism during pregnancy were included and followed until delivery. Maternal obstetric outcomes, fetal growth, birth weight, and early neonatal morbidity were assessed.

Table 1: Age Distribution of Study Participants (n=50)

Age group (years)	Number	Percentage
<20	2	4.0
20–24	12	24.0
25–29	20	40.0
30–34	12	24.0
≥ 35	4	8.0
Total	50	100.0

The majority of participants were in the **25–29 years** age group (40%), followed by 20–24 years and 30–34 years (24% each).

Table 2: Obstetric Characteristics of Study Participants (n=50)

Obstetric characteristic	Number	Percentage
Primigravida	22	44.0
Multigravida	28	56.0
Total	50	100.0

Among the study participants, **56% were multigravida**, while 44% were primigravida.

Table 3: Gestational Age at Diagnosis of Hypothyroidism (n=50)

Gestational age at diagnosis	Number	Percentage
First trimester	18	36.0
Second trimester	24	48.0
Third trimester	8	16.0
Total	50	100.0

Hypothyroidism was diagnosed most commonly during the **second trimester (48%)**, followed by the first trimester (36%).

Table 4: Obstetric Outcomes Among Study Participants (n=50)

Obstetric outcome	Number	Percentage
Normal vaginal delivery	28	56.0
Caesarean delivery	22	44.0
Preterm delivery	8	16.0
Term delivery	42	84.0
Total	50	100.0

A total of **16%** of women had preterm delivery, while 84% delivered at term. Caesarean delivery was observed in 44% of participants.

Table 5: Maternal Obstetric Complications (n=50)

Obstetric complication	Number	Percentage
No major complication	35	70.0
Gestational hypertension/preeclampsia	7	14.0
Gestational diabetes mellitus	5	10.0
Other documented complication	3	6.0
Total	50	100.0

Most women (70%) had no major documented obstetric complication. Hypertensive disorders were observed in 14% and gestational diabetes mellitus in 10%.

Table 6: Birth Weight Distribution (n=50)

Birth weight	Number	Percentage
<2.5 kg	10	20.0
2.5–2.99 kg	19	38.0
3.0–3.49 kg	16	32.0
≥3.5 kg	5	10.0
Total	50	100.0

Low birth weight (<2.5 kg) was observed in 20% of newborns, while 80% had a birth weight of 2.5 kg or above.

Table 7: Fetal Growth Status at Birth (n=50)

Fetal growth status	Number	Percentage
Appropriate for gestational age	40	80.0
Small for gestational age	7	14.0
Large for gestational age	3	6.0
Total	50	100.0

The majority of newborns (80%) were appropriate for gestational age. Small-for-gestational-age status was observed in 14% of newborns.

Table 8: Early Neonatal Morbidity (n=50)

Neonatal outcome	Number	Percentage
No early neonatal morbidity	38	76.0
Respiratory morbidity	5	10.0
Neonatal hypoglycaemia	3	6.0
Neonatal jaundice	3	6.0
Other morbidity	1	2.0
Total	50	100.0

Early neonatal morbidity was documented in **24%** of newborns. Respiratory morbidity was the most frequently observed neonatal complication (10%).

Table 9: NICU Admission (n=50)

NICU admission	Number	Percentage
Required	9	18.0
Not required	41	82.0
Total	50	100.0

NICU admission was required for **18%** of newborns, whereas 82% did not require NICU admission.

Table 10: Overall Neonatal Outcomes (n=50)

Outcome	Number	Percentage
Preterm birth	8	16.0
Low birth weight	10	20.0
Small for gestational age	7	14.0
Early neonatal morbidity	12	24.0
NICU admission	9	18.0

Overall, the observed neonatal outcomes included preterm birth in 16%, low birth weight in 20%, small-for-gestational-age status in 14%, early neonatal morbidity in 24%, and NICU admission in 18% of newborns.

DISCUSSION

The present prospective observational study included 50 pregnant women with hypothyroidism and evaluated their obstetric and early neonatal outcomes. The majority of participants were aged 25–29 years (40%), while 56% were multigravida. Hypothyroidism was diagnosed most frequently during the second trimester (48%), followed by the first trimester (36%). The predominance of diagnosis during pregnancy emphasizes the importance of timely thyroid-function assessment and continued monitoring during gestation. Current international guidance recommends regular thyroid-function assessment during pregnancy because thyroid hormone requirements change substantially during gestation. [1,2] In the present study, 16% of women had preterm delivery, while 84% delivered at term. The observed frequency of preterm birth is consistent with the established association between maternal thyroid dysfunction and prematurity. A meta-analysis of cohort studies reported an increased risk of preterm birth among women with clinical hypothyroidism, with similar associations reported for subclinical hypothyroidism and hypothyroxinemia. [5,6] Recent Indian pooled evidence has also reported preterm birth among pregnancies complicated by hypothyroidism, supporting the clinical relevance of this outcome in the Indian population. [9]

Caesarean delivery was observed in 44% of the women in the present study. Maternal thyroid dysfunction has been examined in relation to several obstetric outcomes, although the association with mode of delivery is not uniform across studies. Differences in obstetric indications, maternal age, parity, gestational complications, fetal status, and institutional practices may contribute to variation in caesarean delivery rates. Therefore, the caesarean rate observed in this study should be interpreted in the context of the study population and local obstetric practice rather than attributed solely to hypothyroidism. Evidence from randomized trials of levothyroxine treatment for subclinical hypothyroidism has also not demonstrated consistent effects on clinical obstetric outcomes, including mode of delivery. [10]

Regarding maternal complications, 14% of participants developed gestational hypertension/preeclampsia and 10% developed gestational diabetes mellitus. These findings are clinically relevant because thyroid dysfunction has been linked with hypertensive disorders and abnormal glucose metabolism during pregnancy. A large individual-participant data meta-analysis found that subclinical hypothyroidism was associated with an increased risk of preeclampsia compared with euthyroidism. [4] Similarly, meta-analytic evidence indicates an association between maternal subclinical hypothyroidism and gestational diabetes mellitus. [8]

Low birth weight was observed in 20% of newborns in the present study. This finding is consistent with previous evidence suggesting an association between maternal hypothyroidism and adverse birth-weight outcomes. A systematic review and meta-analysis reported a tendency toward increased low birth weight among infants born to mothers with hypothyroidism. [7] More recent Indian pooled evidence has also demonstrated a considerable frequency of low birth weight among pregnancies complicated by hypothyroidism, with the reported frequency varying according to the type of hypothyroidism. [9]

In the present study, 14% of newborns were classified as small for gestational age, whereas 80% were appropriate for gestational age and 6% were large for gestational age. The relationship between maternal thyroid dysfunction and fetal growth is complex. Some studies have reported altered fetal growth or birth weight, whereas evidence regarding small-for-gestational-age status has been inconsistent. A systematic review specifically evaluating maternal hypothyroidism found no statistically significant increase in small-for-gestational-age births despite associations with other neonatal outcomes. [7] Therefore, the finding of 14% small-for-gestational-age newborns in the present cohort should be interpreted as an observed outcome rather than evidence of a direct causal effect.

Early neonatal morbidity was documented in 24% of newborns. Respiratory morbidity was the most frequently recorded complication (10%), followed by neonatal hypoglycaemia and jaundice (6% each). NICU admission was required in 18% of neonates. These findings are clinically important because neonatal complications may be influenced by gestational age, birth weight, fetal growth, maternal complications, and the severity and treatment status of maternal thyroid dysfunction.

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Published evidence has demonstrated associations between maternal thyroid abnormalities and several adverse neonatal outcomes, although the strength and certainty of individual associations differ. [7,9]

The present study provides prospective institutional data on obstetric and neonatal outcomes among pregnant women with hypothyroidism. However, the findings should be interpreted in light of several limitations. The sample size was relatively small, the study was conducted at a single institution over six months, and there was no euthyroid comparison group. Therefore, the study cannot determine the excess risk attributable specifically to hypothyroidism or establish causality. Differences in severity of hypothyroidism, thyroid antibody status, treatment adherence, timing of treatment, and other maternal factors may also influence outcomes. Larger prospective studies with appropriate euthyroid control groups and detailed thyroid-function measurements would provide stronger evidence regarding the relationship between maternal hypothyroidism and perinatal outcomes.

Overall, the present study demonstrates that pregnancies complicated by hypothyroidism were accompanied by clinically relevant obstetric and neonatal outcomes, including preterm delivery, low birth weight, fetal growth abnormalities, early neonatal morbidity, and NICU admission. These observations support the importance of early diagnosis, appropriate thyroid hormone replacement when indicated, regular thyroid-function monitoring, and coordinated obstetric and neonatal surveillance during pregnancy. [1,2]

CONCLUSION

Maternal hypothyroidism during pregnancy was associated with clinically relevant obstetric and neonatal outcomes, including preterm delivery, low birth weight, fetal growth abnormalities, early neonatal morbidity, and NICU admission. Early diagnosis, appropriate treatment, regular thyroid-function monitoring, and close obstetric and neonatal surveillance are important to optimize pregnancy and neonatal outcomes.

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