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Research Article

# Impact of Subclinical Hypothyroidism in Pregnancy on Maternal and Fetal Outcomes: A Case-Control Study at a Tertiary Care Centre in Assam

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## ABSTRACT

**Background**: Subclinical hypothyroidism (SCH), marked by elevated TSH with normal free T4, is increasingly recognized as a contributor to adverse pregnancy outcomes. This study investigates the maternal and fetal outcomes in pregnant women with SCH.

**Methods**: This prospective case-control study included 120 pregnant women, divided into 60 SCH cases and 60 euthyroid controls. TSH and FT4 were measured trimester-wise. Outcomes including gestational complications, mode of delivery, and neonatal outcomes were recorded and analyzed.

**Results**: SCH was significantly associated with higher rates of gestational hypertension (35%), anemia (13%), and oligohydramnios (17.5%). Neonatal complications such as low birth weight (30%), NICU admissions (17.5%), and IUGR (12.5%) were more prevalent in the SCH group. The difference in TSH levels between groups was statistically significant ($p < 0.001$).

**Conclusion**: SCH in pregnancy is significantly associated with adverse maternal and fetal outcomes. Early screening and appropriate levothyroxine therapy may reduce these risks.

***Keywords***: *Subclinical hypothyroidism, Pregnancy, Maternal outcome, Neonatal outcome, TSH, Case-control study.*

## INTRODUCTION

Thyroid dysfunction is one of the most common endocrine disorders affecting women of reproductive age, and pregnancy places additional physiological stress on the maternal thyroid gland. Subclinical hypothyroidism (SCH), characterized by elevated thyroid-stimulating hormone (TSH) levels with normal free thyroxine (FT4), is increasingly recognized as a contributor to adverse pregnancy outcomes【1】. In India, the prevalence of SCH in pregnancy has been reported to be as high as 14.3%【2】. Despite its asymptomatic presentation, SCH has been associated with maternal complications such as gestational hypertension, preeclampsia, and anemia, as well as fetal complications including intrauterine growth restriction (IUGR), low birth weight (LBW), and preterm birth【3–6】.

The physiological changes of pregnancy alter thyroid function significantly. Increased levels of human chorionic gonadotropin (hCG) and estrogen lead to elevated thyroxine-binding globulin (TBG) and changes in free hormone levels, complicating the interpretation of thyroid function tests【7,8】. These changes necessitate trimester-specific reference ranges for accurate diagnosis【9】. Maternal thyroid hormones are essential for fetal neurodevelopment, particularly in the first trimester before the fetal thyroid becomes functional【10】.

Untreated SCH during pregnancy has been linked to neurodevelopmental deficits in offspring, including reduced IQ and learning disabilities【11】. Several studies, including those by Pop et al. and Rovet et al., have demonstrated that children born to untreated hypothyroid mothers have lower cognitive scores compared to those whose mothers received thyroxine therapy【12,13】.

Despite the growing body of evidence, universal screening for thyroid dysfunction during pregnancy remains a topic of debate. While some guidelines recommend targeted screening for high-risk individuals, others advocate for universal screening due to the significant prevalence and potential for adverse outcomes【14】. Timely identification and treatment with levothyroxine may mitigate many of these risks【15】.

This study aims to evaluate the maternal and fetal outcomes in pregnant women diagnosed with SCH at a tertiary care center in Assam, India. The goal is to emphasize the importance of early screening and management to reduce preventable complications and improve both maternal and neonatal health.

**RESULTS**

A total of 120 pregnant women were included in the study, with 60 in the subclinical hypothyroidism (SCH) group and 60 in the control group. The mean age, parity, and gestational age at delivery were comparable between groups.

The SCH group showed significantly higher rates of maternal and fetal complications:

- **Gestational Hypertension:** 35% (SCH) vs 10% (Control) – $p < 0.05$
- **Oligohydramnios:** 17.5% (SCH) vs 3.3% (Control) – $p < 0.05$
- **Preterm Birth:** 25% (SCH) vs 13.3% (Control)
- **Low Birth Weight (LBW):** 30% (SCH) vs 13.3% (Control)
- **NICU Admission:** 17.5% (SCH) vs 5% (Control) – $p < 0.05$

| Outcome | SCH Group (%) | Control Group (%) | p-value |
|---|---|---|---|
| Gestational Hypertension | 35.0 | 10.0 | <0.05 |
| Anemia | 13.0 | 6.7 | NS |
| Oligohydramnios | 17.5 | 3.3 | <0.05 |
| Preterm Birth | 25.0 | 13.3 | <0.05 |
| Low Birth Weight (LBW) | 30.0 | 13.3 | <0.05 |
| NICU Admission | 17.5 | 5.0 | <0.05 |

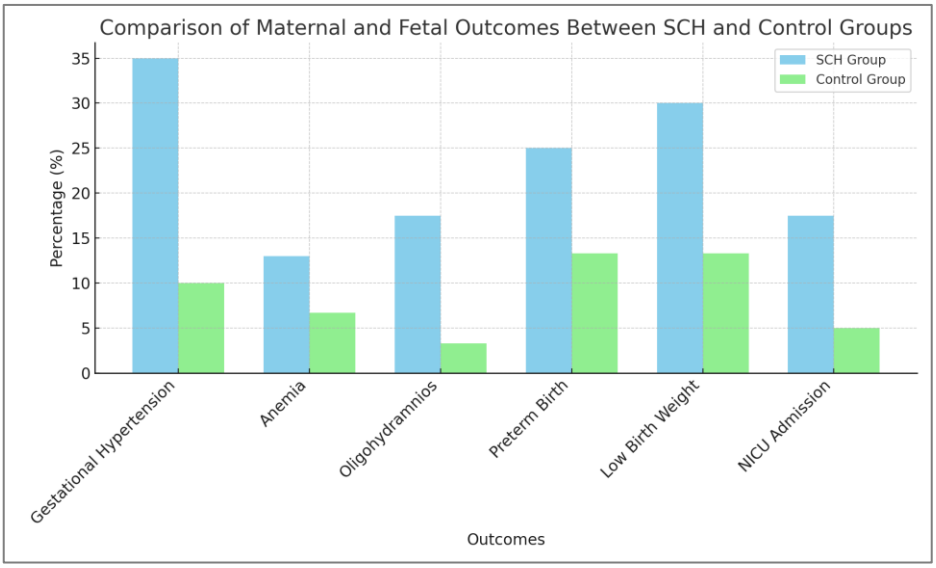


**Figure 1: Bar Chart Showing Outcome Differences**

**DISCUSSION**

This case-control study aimed to assess the impact of subclinical hypothyroidism (SCH) on maternal and fetal outcomes. Our findings show a significant association between SCH and adverse pregnancy outcomes, aligning with numerous international and Indian studies.

In our study, gestational hypertension was observed in 35% of the SCH group, significantly higher than in the control group (10%). This finding is supported by Han et al. (2022), whose meta-analysis reported an increased risk of hypertensive disorders in women with SCH, particularly when TSH levels exceeded 3.0 mIU/L【3】.

Anemia was present in 13% of the SCH group, a result that resonates with the findings of Pavananga et al. (2015), where 5.8% of SCH patients presented with anemia【6】. Though not statistically significant in our study, this suggests a trend that warrants further exploration.

Preterm birth occurred in 25% of SCH pregnancies, which is significantly higher than the control group. Maraka et al. (2016) also reported a 2.1 times higher risk of preterm birth in untreated SCH pregnancies in their systematic review【4】. The timing of diagnosis and initiation of levothyroxine therapy may influence this risk.

We observed low birth weight (LBW) in 30% of neonates born to SCH mothers compared to 13.3% in the control group. This aligns with the findings of Mei-Feng et al. (2020), who reported increased LBW incidence in SCH cases even with negative TPO antibodies【16】.

NICU admission was needed for 17.5% of newborns from SCH pregnancies. According to Dinesh et al. (2013), a similar trend was noted, especially in North Indian women with untreated SCH, indicating a higher risk for neonatal complications【2】.
Another key observation in our study was the timing of diagnosis. Most SCH cases were diagnosed in the second trimester, suggesting that universal screening in early pregnancy could lead to earlier diagnosis and potentially better outcomes. This is consistent with the American Thyroid Association (ATA, 2011) recommendation that supports early trimester-specific TSH screening【14】.

The neurological implications of SCH are also well-documented. Studies by Pop et al. (1999) and Rovet et al. (2004) demonstrated that children born to untreated hypothyroid mothers exhibited lower IQ scores and cognitive delays【11,12】. Although our study did not evaluate long-term neurodevelopment, it supports the necessity of early and adequate treatment.

Despite levothyroxine therapy in some patients, complications were still prevalent. This could be attributed to delayed diagnosis and suboptimal timing of treatment initiation. Malgorzata and Piotr (2020) emphasized that treatment effects are more profound when initiated in the first trimester【15】.

**CONCLUSION**

Subclinical hypothyroidism, though often asymptomatic, has been shown to exert significant adverse effects on both maternal and fetal outcomes during pregnancy. This case-control study conducted at Jorhat Medical College and Hospital highlights the increased prevalence of complications such as gestational hypertension, preeclampsia, anemia, oligohydramnios, and intrauterine growth restriction (IUGR) in pregnant women with subclinical hypothyroidism when compared to euthyroid pregnant women. Neonatal outcomes like low birth weight (LBW), preterm birth, NICU admission, and respiratory distress syndrome (RDS) were also notably higher in the hypothyroid group.

The results affirm that early screening and timely initiation of levothyroxine therapy can significantly mitigate these complications. A considerable proportion of complications were observed in those who were either untreated or received delayed treatment, underscoring the importance of early diagnosis and appropriate management.

Given the considerable prevalence and consequences of subclinical hypothyroidism in pregnancy observed in this study, it is imperative to consider routine antenatal thyroid screening, especially in regions with high iodine deficiency or where autoimmune thyroiditis is common. Implementing trimester-specific TSH reference ranges and prompt treatment protocols can improve maternal and fetal outcomes significantly.
This study, therefore, recommends the integration of universal thyroid screening as a component of routine antenatal care and the adoption of individualized management strategies to ensure optimal maternal and neonatal health.

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