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Thyroid Dysfunction and Hypertensive Disorders during Pregnancy: A Prospective Observational Study

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ABSTRACT

Background: Hypertensive disorders affect approximately 10% of pregnancies, significantly impacting maternal and fetal health, particularly in low- and middle-income countries. Thyroid dysfunction during pregnancy is an underexplored factor that can exacerbate hypertensive conditions, contributing to poor outcomes. This study investigates the prevalence of thyroid dysfunction in pregnant women with hypertension and its impact on maternal and perinatal outcomes.

Methods: A prospective observational study was conducted at NSCB Medical College, including 378 hypertensive pregnant women. Patients were categorized into euthyroid and thyroid dysfunction groups based on thyroid function tests. Data were analyzed using IBM SPSS 20 with $p<0.05$ considered significant.

Results: In this study, 25.93% of hypertensive pregnancies had thyroid dysfunction, with 21.69% subclinical hypothyroidism and 3.17% overt hypothyroidism. Thyroid dysfunction was associated with more severe hypertension ($p=0.009$) and occurred more frequently in earlier gestational ages. The dysfunction group had significantly higher ICU admissions (64.6%) and maternal deaths (55.6%, $p<0.05$). Additionally, babies in the dysfunction group had worse perinatal outcomes, with more low birth weight and NICU admissions (57.1%).

Conclusion: The study has concluded that thyroid dysfunction, particularly subclinical hypothyroidism, is prevalent among pregnant women with hypertensive disorders and is significantly associated with adverse maternal and perinatal outcomes.

Key-words: Hypothyroidism, Hypertensive disorders, Pregnancy, Hypertensive, Thyroid

INTRODUCTION

Hypertension impacts approximately 10% of pregnant women and is linked to elevated rates of fetal and maternal hospitalization and mortality. Hypertensive disorders during pregnancy are significant contributors to maternal, fetal, and perinatal mortality globally, especially in middle- and low-income countries [1].

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Hypertension during pregnancy can be categorized into chronic hypertension, preeclampsia-eclampsia, preeclampsia superimposed on chronic hypertension, and gestational hypertension. Despite its significant impact on maternal and neonatal health, there is limited evidence concerning the risk of thyroid dysfunction associated with hypertension. High blood pressure during pregnancy has been linked to various effects on the body, increasing the mother's susceptibility to complications before, during, or after childbirth [2]. Gestational hypertension affects 10-15% of pregnancies, with up to 10-25% of affected women eventually developing proteinuria and other manifestations indicative of preeclampsia. Preeclampsia poses substantial risks for maternal morbidity, including

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pulmonary edema, liver failure, eclampsia, and cardiovascular events, contributing to approximately 15% of maternal deaths [3]. Despite its high incidence and association with severe complications, the pathogenesis of pregnancy-induced hypertensive disorders remains incompletely understood.

Thyroid dysfunctions, including hyperthyroidism and hypothyroidism, during pregnancy can trigger hypertension and various adverse health outcomes for both the fetus and the mother. Hypothyroidism may act as an independent risk factor for conditions such as preeclampsia and fetal growth restriction. However, the precise roles of thyroid dysfunction in contributing to hypertensive disorders during pregnancy remain unclear [4]. Maintaining optimal maternal thyroid function throughout pregnancy ensures an uncomplicated gestation. This study aims to know the incidence of thyroid dysfunction in hypertensive disorders during pregnancy and analyze fetomaternal outcomes in patients with thyroid dysfunction.

MATERIALS AND METHODS

Research Design- This prospective observational study was conducted in the Department of Obstetrics and Gynaecology at Netaji Subhash Chandra Bose Medical College and Hospital in Jabalpur, Madhya Pradesh, from July 2022 to June 2024. Ethical clearance was obtained from the institutional ethics committee. The study included 378 pregnant women with hypertensive disorders attending the Antenatal Care (ANC) Outpatient Department (OPD) at the hospital.

Inclusion Criteria- Patients meeting the inclusion criteria were enrolled after obtaining informed written consent. Detailed histories were gathered, followed by comprehensive physical and obstetrical examinations. Routine and specific investigations for preeclampsia were conducted, and fasting venous samples were collected to estimate serum levels of thyroid-stimulating hormone (TSH), free triiodothyronine (T3), and free thyroxine (T4).

Exclusion Criteria- The study excluded pregnant women with pre-existing thyroid disorders diagnosed before pregnancy, those with known autoimmune diseases or chronic medical conditions such as diabetes, renal disease, or cardiovascular disease that could independently affect pregnancy outcomes. It also excluded women with a history of thyroid surgery or radiation therapy to the neck, patients on medications that affect thyroid function (such as amiodarone and lithium), those with multiple pregnancies (twins or triplets), and women who did not provide informed consent or were lost to follow-up during the study.

Statistical Analysis- Based on the reports of thyroid function tests, hypertensive patients were categorized into two groups: those with thyroid dysfunction and euthyroid hypertensive patients. Data were analyzed using IBM SPSS version 20, with parametric and non-parametric tests, including Chi-square, T-Test, Z Test, and U-Test, to assess associations, with a significance level set at $p<0.05$.

Ethical Approval- The hospital's Ethical Committee has approved the study.

RESULTS

Table 1 shows that 25.93% of the patients had thyroid dysfunction, with 21.69% having subclinical hypothyroidism, 3.17% having overt hypothyroidism, and 0.26% with hyperthyroidism. The remaining 74.07% were euthyroid. This highlights the significant prevalence of subclinical hypothyroidism among hypertensive pregnancies, indicating the need for thyroid screening in these patients.

Table 1: Distribution of Patients According to Thyroid Status in Hypertensive Disorder of Pregnancy

Thyroid status	Number of patients	Percentage (%)
Euthyroid	280	74.07
Thyroid dysfunction	98	25.93
• Hypothyroid (subclinical)	81	21.69
• Hypothyroid (overt)	12	3.17
Hyperthyroidism	1	0.26

Among patients with mild hypertension (SBP 140-160), 82.6% were euthyroid, while 17.4% had thyroid dysfunction. For severe hypertension (SBP>160), 49% were euthyroid, and 51% had thyroid dysfunction.

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The p-value of 0.009 indicates a statistically significant difference in systolic blood pressure distribution between euthyroid and thyroid dysfunction patients. This suggests that thyroid dysfunction could be associated with more severe hypertension (Table 2).

Table 2: Distribution of Patients According to SBP

SBP	Euthyroid Frequency (%)	Thyroid Dysfunction Frequency (%)	Total
Mild (140-160)	233 (82.6)	49 (17.4)	282
Severe (>160)	47 (49.0)	49 (51.0)	96

In pregnancies less than 28 weeks, 59.3% had thyroid dysfunction, compared to 19.8% in pregnancies between 29-34 weeks. The data points to a higher prevalence of thyroid dysfunction in earlier gestational ages, suggesting a possible link between early gestation and thyroid complications (Table 3).

Table 3: Distribution of Patients According to Gestational Age

Gest. Age	Euthyroid Frequency (%)	Thyroid Dysfunction Frequency (%)	Total
<28 Weeks	24 (40.7)	35 (59.3)	59
29-34 Weeks	255 (80.2)	63 (19.8)	318
>34 Weeks	1 (100.0)	0	1

Table 4 shows the ICU admission rates were 64.6% in the thyroid dysfunction group, compared to 35.4% in the euthyroid group. Similarly, 64% of near-miss cases and 55.6% of maternal deaths were observed in the thyroid dysfunction group. These numbers indicate that thyroid dysfunction is associated with a higher risk of severe maternal complications, with a $p<0.05$, making it statistically significant.

Table 4: Maternal Complications in Euthyroid and Thyroid Dysfunction Groups in Hypertensive Disorder of Pregnancy

Maternal Complication	Euthyroid Frequency (%)	Thyroid Dysfunction Frequency (%)	Total
ICU Admission	40 (35.4)	73 (64.6)	113
Near Miss	36 (36.0)	64 (64.0)	100
Death	4 (44.4)	9 (55.6)	13

Only 3.5% of babies with thyroid dysfunction had a healthy birth weight (>2.5kg), compared to 67.6% in the euthyroid group. Meanwhile, 32.4% of babies with thyroid dysfunction had low birth weight (1.5-2.5kg), and 66.7% had very low birth weight (<1.5kg). The higher incidence of low birth weight and NICU admissions (57.1%) in the thyroid dysfunction group underscores the adverse perinatal outcomes associated with thyroid dysfunction (Table 5).

Table 5: Distribution of Patients According to Perinatal Outcome Weight in hypertensive disorder of pregnancy

Perinatal Outcome	Thyroid Dysfunction	Euthyroid	Total
Healthy (>2.5kg) (143)	5(3.5)	138(67.6)	143

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Low birth weight(<2.5kg-1.5kg) (170)	55(32.4)	115(67.6)	170
Very low birth weight (<1.5-1kg) (15)	10(66.7)	5(33.3)	15
Extremely low birth weight (<1 kg) (4)	4(100.0)	0	4
NICU	64(57.1)	48(42.9)	112

DISCUSSION

This study explored the association between thyroid dysfunction and hypertensive disorders during pregnancy, highlighting significant findings related to maternal and perinatal outcomes. An earlier study conducted among pregnant Nigerian women with a mean age of 28 years reported that maternal age was not associated with systolic blood pressure in any trimester. However, a positive correlation was found between maternal age and diastolic blood pressure at 30–38 weeks of gestation [5,6].

Gaillard *et al.* also reported an association between older maternal age and higher third-trimester diastolic blood pressure. They described that the differences in blood pressure between younger and older women appear to be small, and the results regarding the association of maternal age with the risk of gestational hypertensive disorders are inconsistent [7,8]. A large Swedish population-based cohort study among nulliparous women aged ≤34 years reported that maternal age was not associated with hypertension in pregnancy [7]. This study had a positive correlation between age and hypertension, similar to our present study, where most patients were aged 20-30 (79.10%). The findings from our study correlated with previous studies regarding the relationship between maternal age and hypertension during pregnancy [8].

The study found that 25.93% of patients had thyroid dysfunction, predominantly subclinical hypothyroidism (21.69%), aligning with existing literature on the high prevalence of thyroid dysfunction in hypertensive pregnancies, underscoring the importance of routine screening [9,10]. A significant difference in thyroid dysfunction was observed across education levels, with less than 12th-grade education showing the highest prevalence (17.69%), suggesting educational interventions could improve thyroid health management during pregnancy [11,12]. Primigravida patients had a higher prevalence of thyroid dysfunction (27.39%), indicating the need for closer monitoring of first-time pregnancies for thyroid-related complications [13,14]. Patients with thyroid dysfunction showed higher percentages of severe SBP (>160 mmHg) and DBP (>110 mmHg), suggesting thyroid dysfunction exacerbates hypertensive conditions, leading to more severe complications [15,16]. Thyroid dysfunction was more prevalent in patients with gestational age <28 weeks, highlighting the potential impact on preterm birth and emphasizing the need for effective thyroid function management [17,18]. Maternal complications, including ICU admissions and deaths, were significantly higher in the thyroid dysfunction group, underscoring the severe impact of thyroid dysfunction on maternal health and the necessity for comprehensive management strategies [19,20]. Perinatal outcomes were worse in the thyroid dysfunction group, with higher rates of low birth weight and NICU admissions, consistent with previous studies linking thyroid dysfunction to adverse perinatal outcomes, stressing the importance of thyroid health in pregnancy [21-23]. Routine thyroid function screening for pregnant women, particularly those with hypertensive disorders, is crucial, as early detection and management of thyroid [24,25]

CONCLUSIONS

The study has concluded that thyroid dysfunction, particularly subclinical hypothyroidism, is prevalent among pregnant women with hypertensive disorders and is significantly associated with adverse maternal and perinatal outcomes. This study highlights the significant association between thyroid dysfunction and hypertensive disorders during pregnancy. The findings indicate that thyroid dysfunction, particularly hypothyroidism, is prevalent among pregnant women with hypertension and is associated with adverse maternal and perinatal outcomes. Therefore, routine screening for thyroid function during pregnancy, especially in women with hypertensive disorders, is recommended. Early detection and management of thyroid dysfunction may help mitigate risks and improve health outcomes for both the mother and the baby.

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CONTRIBUTION OF AUTHORS

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