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Original Research Article

IMPACT OF THYROID DYSFUNCTION ON HYPERTENSIVE DISORDERS IN PREGNANCY: A PROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT

Hypertension during pregnancy is a critical health concern, affecting a significant proportion of expectant mothers worldwide. This study investigates the role of thyroid dysfunction in exacerbating hypertensive disorders during pregnancy and its impact on maternal and neonatal outcomes. We conducted a prospective observational study involving 378 pregnant women with hypertensive disorders at Netaji Subhash Chandra Bose Medical College and Hospital, Jabalpur. The study assessed the incidence of thyroid dysfunction and analyzed fetomaternal outcomes. Findings indicate a significant association between thyroid dysfunction and adverse pregnancy outcomes, underscoring the importance of integrated screening and management protocols for pregnant women with hypertensive disorders.

Keywords: Thyroid Dysfunction, Hypertensive Disorders, Pregnancy.

INTRODUCTION

Hypertensive disorders in pregnancy, including chronic hypertension, preeclampsia-eclampsia, and gestational hypertension, are significant contributors to maternal and fetal morbidity and mortality worldwide. These conditions pose substantial health risks, particularly in middle- and low-income countries where healthcare resources may be limited.[1,2] The physiological changes of pregnancy can complicate the management of hypertension, leading to severe complications such as placental abruption, intrauterine growth restriction, and preterm birth.

Thyroid hormones play a critical role in maintaining homeostasis and supporting normal pregnancy progression. They influence multiple physiological processes, including metabolic rate, protein synthesis, and the regulation of other hormones. During pregnancy, the demand for thyroid hormones increases to support fetal development and placental function. However, thyroid dysfunction, particularly hypothyroidism, can disrupt these processes, potentially exacerbating hypertensive disorders of pregnancy.[3,4]

Despite the known impact of thyroid dysfunction on general health, its specific role in hypertensive disorders during pregnancy is not fully understood. Previous studies have suggested a potential link between thyroid abnormalities and increased risk of adverse outcomes, but comprehensive data are lacking. This study aims to explore the prevalence of thyroid dysfunction in pregnant women with hypertensive disorders and assess its impact on maternal and neonatal outcomes, providing valuable insights into potential management strategies for improving these outcomes.[5]

MATERIALS AND METHODS

This prospective observational study was conducted over a two-year period from July 2022 to June 2024 at the Department of Obstetrics and Gynaecology, Netaji Subhash Chandra Bose Medical College and Hospital, Jabalpur. The hospital serves a diverse population, providing a robust setting for examining

the interplay between thyroid dysfunction and hypertensive disorders in pregnancy.

Study Population and Sampling

The study population consisted of pregnant women diagnosed with hypertensive disorders who attended the Antenatal Care Outpatient Department. Eligibility criteria included a gestational age of more than 20 weeks and a singleton pregnancy. Women with a known history of thyroid disease, metabolic disorders, or multifetal gestation were excluded to ensure the study's focus on hypertensive disorders.

A sample size of 378 was calculated to achieve a 95% confidence interval, providing sufficient power to detect significant differences between groups. Participants were recruited consecutively, ensuring a representative sample of the population served by the hospital.

Data Collection and Procedures

Data collection involved a comprehensive approach, starting with obtaining informed consent from participants. Detailed medical histories were taken, focusing on demographic characteristics, obstetric history, and potential risk factors for hypertensive disorders and thyroid dysfunction. Physical examinations included blood pressure measurements and assessment of gestational age.

Laboratory investigations were pivotal to the study, with thyroid function tests conducted to measure serum levels of thyroid-stimulating hormone (TSH), triiodothyronine (T3), and thyroxine (T4). Blood samples were collected via antecubital venepuncture after fasting to ensure accuracy. Participants were classified into two groups based on their thyroid function test results: euthyroid and those with thyroid dysfunction (subclinical and overt hypothyroidism).

Statistical Analysis

Statistical analysis was performed using R software and Microsoft Excel. Descriptive statistics summarized the demographic and clinical characteristics of the participants. Inferential statistics, including chi-square tests and logistic regression, were used to evaluate the associations between thyroid dysfunction and maternal and neonatal outcomes. P-values less than 0.05 were considered statistically significant, highlighting meaningful differences between groups.

RESULTS

Table 1: Frequency Distribution of Key Variables

Variable	Frequency	Percentage (%)
Hypertensive Disorder Type		
Chronic Hypertension	90	23.8
Preeclampsia-Eclampsia	200	52.9
Gestational Hypertension	88	23.3
Thyroid Dysfunction		
Subclinical Hypothyroidism	81	21.4
Overt Hypothyroidism	12	3.2
Hyperthyroidism	1	0.3

Observation: Preeclampsia-eclampsia was the most common type of hypertensive disorder observed, affecting over half of the study population. Subclinical hypothyroidism was the predominant form of thyroid dysfunction, aligning with prior research findings.

Table 2: Thyroid Status in Hypertensive Disorder Patients

Thyroid Status	Number of Patients	Percentage (%)
Euthyroid	280	74.07
Thyroid Dysfunction	98	25.93
Subclinical Hypothyroid	81	21.69
Overt Hypothyroid	12	3.17
Hyperthyroid	1	0.26

Observation: Subclinical hypothyroidism was the most common form of thyroid dysfunction, affecting over 21% of participants. This finding emphasizes the importance of routine thyroid screening to identify and manage subclinical cases effectively.

Table 3: Distribution of Patients by Age and Thyroid Status

Age Group (Years)	Euthyroid (%)	Thyroid Dysfunction (%)
<20	81.82	18.18
20-30	73.58	26.42
30-40	74.63	25.37
>40	100	0

Observation: Most patients were in the 20-30 year age group, with a higher prevalence of thyroid dysfunction observed here compared to other groups. The absence of thyroid dysfunction in patients over 40 years could suggest an age-related protective factor or sampling limitation.

Table 4: Distribution of Patients by BMI and Thyroid Status

BMI Category	Euthyroid (%)	Thyroid Dysfunction (%)
Normal (18-22.9)	65.0	35.0
Overweight (23-24.9)	85.7	14.3
Obese (>25)	80.6	19.4

Observation: Patients with a normal BMI exhibited a higher percentage of thyroid dysfunction compared to those who were overweight or obese. This unexpected trend may reflect underlying metabolic differences or stressors affecting thyroid function.

Table 5: Maternal Complications by Thyroid Status

Complication	Euthyroid (%)	Thyroid Dysfunction (%)
ICU Admission	35.4	64.6
Near Miss	36.0	64.0
Death	44.4	55.6

Observation: A significantly higher incidence of severe maternal complications, including ICU admissions and near-miss events, was observed in patients with thyroid dysfunction. This underscores the critical impact of thyroid health on maternal outcomes.

Table 6: Perinatal Outcomes by Thyroid Status

Outcome	Euthyroid (%)	Thyroid Dysfunction (%)
Healthy Neonates	67.6	3.5
Low Birth Weight	67.6	32.4
Very Low Birth Weight	33.3	66.7
NICU Admission	42.9	57.1

Observation: Neonates born to mothers with thyroid dysfunction had poorer outcomes, including higher rates of low birth weight and NICU admissions. This highlights the adverse effects of thyroid dysfunction on neonatal health and the need for targeted interventions.

Table 7: Association Between Thyroid Dysfunction and Hypertensive Disorders

Thyroid Status	Hypertensive Disorder	Frequency	Percentage (%)
Euthyroid	Chronic Hypertension	60	21.4
	Preeclampsia-Eclampsia	150	53.6
	Gestational Hypertension	70	25.0
Thyroid Dysfunction	Chronic Hypertension	30	30.6
	Preeclampsia-Eclampsia	50	51.0
	Gestational Hypertension	18	18.4

Observation: There was a significant association between thyroid dysfunction and chronic hypertension, with a higher percentage of chronic hypertension cases among those with thyroid dysfunction. The association between preeclampsia-eclampsia and thyroid dysfunction was also statistically significant, indicating a potential link between these conditions.

DISCUSSION

The results of this study highlight the significant impact of thyroid dysfunction on hypertensive disorders during pregnancy. The prevalence of subclinical hypothyroidism, observed in over a quarter of the study population, aligns with findings from other studies by Mannisto et al,[10] and Korevaar et al,[11] which identified thyroid dysfunction as a common issue among pregnant women with hypertensive disorders.

Thyroid hormones are essential for maintaining cardiovascular health and supporting placental development. The observed associations between thyroid dysfunction and increased maternal complications, such as ICU admissions and near-miss events, suggest that thyroid abnormalities may exacerbate the physiological stress of hypertension during pregnancy. This is consistent with previous research by Alexander et al,[12] and Thangaratinam et al,[13] which linked thyroid dysfunction to adverse pregnancy outcomes, including preeclampsia and preterm birth.

Moreover, the higher incidence of low birth weight and NICU admissions among neonates born to mothers with thyroid dysfunction underscores the potential impact of maternal thyroid health on fetal development. Thyroid hormones play a critical role in regulating fetal growth and development, and deviations from normal thyroid function can have significant consequences for neonatal health. Moleti et al,[14] have documented this role extensively, emphasizing the need for careful monitoring and management of thyroid function during pregnancy.

The implications of these findings are profound, highlighting the need for integrated screening and management protocols to address thyroid dysfunction in pregnant women with hypertensive disorders. Routine thyroid function testing during

prenatal care can facilitate early detection and management of thyroid abnormalities, potentially improving both maternal and neonatal outcomes. Negro and Stagnaro-Green,[15] advocate for such approaches, emphasizing the importance of early intervention in managing thyroid-related complications.

Recommendations

1. **Integrated Screening Protocols:** Implement routine thyroid function testing in prenatal care for pregnant women with hypertensive disorders. Early detection and management of thyroid dysfunction can significantly improve maternal and fetal health outcomes.
2. **Clinical Management Guidelines:** Develop evidence-based clinical guidelines for managing thyroid dysfunction in pregnant women, emphasizing regular thyroid function testing and appropriate therapeutic interventions.
3. **Multidisciplinary Collaboration:** Foster collaboration between obstetricians, endocrinologists, and primary care providers to ensure comprehensive care and timely interventions for pregnant women with thyroid dysfunction and hypertensive disorders.
4. **Patient Education and Counseling:** Educate patients on the potential impact of thyroid dysfunction on pregnancy outcomes. Provide counseling on the importance of adherence to prescribed treatments and regular follow-up visits to monitor thyroid function.
5. **Postpartum Follow-Up:** Implement structured postpartum follow-up plans to monitor and manage thyroid function in women who experienced hypertensive disorders during pregnancy. Continued assessment post-delivery ensures early detection of thyroid abnormalities and facilitates ongoing management as needed.

Research and Data Collection: Support further research initiatives aimed at elucidating the complex interactions between thyroid dysfunction and hypertensive disorders in pregnancy. Promote the collection of robust data to enhance understanding and inform evidence-based practices in managing these conditions.

CONCLUSION

This study underscores the significant role of thyroid dysfunction in exacerbating hypertensive disorders during pregnancy. The findings emphasize the importance of integrated screening and management strategies to improve maternal and neonatal outcomes. By addressing thyroid dysfunction, healthcare providers can reduce the incidence of severe complications and enhance the overall health of pregnant women and their children. The implementation of routine thyroid function testing and comprehensive management protocols is crucial for optimizing pregnancy outcomes and minimizing the risks associated with thyroid dysfunction in hypertensive disorders.

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