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RESEARCH ARTICLE

Assessment of Thyroid Function Among Hypertensive Pregnant Women: A Cross Sectional Study

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ABSTRACT

Background: Hypertensive disorders of pregnancy are among the leading causes of maternal and perinatal morbidity worldwide. Thyroid dysfunction during pregnancy has been associated with adverse obstetric outcomes including gestational hypertension and preeclampsia. Early recognition of altered thyroid status among hypertensive pregnant women may improve maternal and fetal outcomes.

Objective: To assess thyroid function status among hypertensive pregnant women and determine the prevalence of thyroid dysfunction in this population.

Materials and Methods: A hospital-based cross-sectional study was conducted at Bhagwan Mahavir Institute of Medical Sciences, Pawapuri, India, over a period of one year from February 2025 to January 2026. A total of 60 hypertensive pregnant women were enrolled. Detailed clinical history, obstetric examination, blood pressure measurement, and laboratory investigations including serum thyroid-stimulating hormone (TSH), free thyroxine (FT4), and free triiodothyronine (FT3) were performed. Thyroid status was categorized according to trimester-specific reference ranges. Data were analyzed using SPSS version 26.0. Statistical significance was considered at $p<0.05$.

Results: The mean age of participants was 27.8±4.6 years. Gestational hypertension was present in 36 (60.0%) women, preeclampsia in 18 (30.0%), and chronic hypertension in 6 (10.0%). Thyroid dysfunction was identified in 21 (35.0%) participants. Subclinical hypothyroidism was the most common abnormality seen in 13 (21.7%), followed by overt hypothyroidism in 5 (8.3%) and subclinical hyperthyroidism in 3 (5.0%). Mean TSH levels were significantly higher among women with preeclampsia compared with gestational hypertension (4.82±1.76 vs 3.11±1.28 mIU/L, $p=0.002$). Higher systolic blood pressure showed positive correlation with TSH levels ($r=0.42$, $p=0.001$).

Conclusion: Thyroid dysfunction, particularly hypothyroidism, is common among hypertensive pregnant women. Routine thyroid screening may be beneficial in hypertensive pregnancies for early diagnosis and timely management.

Keywords: Pregnancy, Hypertension, Preeclampsia, Thyroid Function, TSH, India

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INTRODUCTION

Hypertensive disorders complicate approximately 5–10% of pregnancies and remain a major contributor to maternal and fetal morbidity and mortality worldwide.[1] These disorders include chronic hypertension, gestational hypertension, preeclampsia, and eclampsia. In developing countries such as India, hypertensive disorders of pregnancy continue to be a major public health concern because of delayed diagnosis and limited access to antenatal care.[2]

Pregnancy induces significant physiological changes in thyroid function due to increased estrogen levels, elevated thyroxine-binding globulin, placental human chorionic gonadotropin activity, and altered iodine metabolism.[3] Maintenance of euthyroid status is essential for normal maternal adaptation and fetal neurodevelopment.[4]

Thyroid dysfunction during pregnancy, especially hypothyroidism, has been associated with miscarriage, anemia, placental abruption, preterm birth, low birth weight,

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and hypertensive disorders including preeclampsia.[5,6] Subclinical hypothyroidism may remain asymptomatic and can only be detected through biochemical screening.[7]

Several mechanisms have been proposed linking thyroid dysfunction with hypertension in pregnancy. Reduced thyroid hormone levels may impair endothelial function, increase systemic vascular resistance, and alter placental vascular development.[8] Autoimmune thyroid disease has also been implicated in adverse pregnancy outcomes.[9]

Preeclampsia is characterized by hypertension and proteinuria or end-organ dysfunction after 20 weeks of gestation. Women with preeclampsia have been reported to exhibit elevated serum TSH and reduced FT4 levels compared with normotensive pregnant women.[10,11]

Despite growing evidence, routine thyroid screening in hypertensive pregnant women is not universally practiced in India. Regional data remain limited, particularly from eastern India. Identification of thyroid abnormalities in hypertensive pregnancies may facilitate targeted management and improved outcomes.[12]

Therefore, the present study was undertaken to assess thyroid function among hypertensive pregnant women attending a tertiary care center in Bihar, India.

MATERIALS AND METHODS

Study Design

Hospital-based cross-sectional study.

Study Setting

Department of Obstetrics and Gynecology, Bhagwan Mahavir Institute of Medical Sciences, Pawapuri, Bihar, India.

Study Duration

1 year (February 2025 to January 2026).

Sample Size

60 hypertensive pregnant women.

Table 1: Baseline Characteristics of Study Participants (n=60)

Variable	*Value*
Mean age (years)	27.8 ± 4.6
Mean gestational age (weeks)	31.2 ± 4.1
Primigravida	36 (60.0%)
Multigravida	24 (40.0%)
Mean systolic BP (mmHg)	149.6 ± 12.4
Mean diastolic BP (mmHg)	96.8 ± 8.5

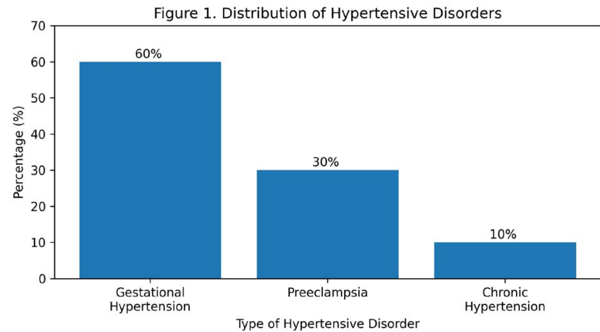

Figure 1: Distribution of Hypertensive Disorders

Table 2: Type of Hypertension in Pregnancy

Diagnosis	*Frequency*	*Percentage*
Gestational hypertension	36	60.0%
Preeclampsia	18	30.0%
Chronic hypertension	6	10.0%

Table 3: Thyroid Function Categories

Thyroid Status	*Frequency*	*Percentage*
Euthyroid	39	65.0%
Subclinical hypothyroidism	13	21.7%
Overt hypothyroidism	5	8.3%
Subclinical hyperthyroidism	3	5.0%

Inclusion Criteria

- Pregnant women aged 18–40 years
- Diagnosed hypertension during pregnancy
- Singleton pregnancy
- Provided informed consent

Exclusion Criteria

- Known thyroid disorder on treatment before pregnancy

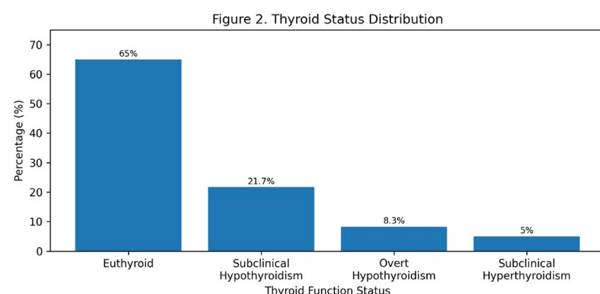

Figure 2: Thyroid Status Distribution

Table 4: Thyroid Parameters by Type of Hypertension

Parameter	*Gestational HTN (n=36)*	*Preeclampsia (n=18)*	*Chronic HTN (n=6)*	*p-value*
TSH (mIU/L)	3.11 ± 1.28	4.82 ± 1.76	3.64 ± 1.35	0.002
FT4 (ng/dL)	1.08 ± 0.21	0.91 ± 0.19	1.02 ± 0.18	0.011
FT3 (pg/mL)	2.89 ± 0.42	2.61 ± 0.37	2.77 ± 0.35	0.038

Table 5: Correlation of TSH with Blood Pressure

Variable	Correlation coefficient (r)	p-value
Systolic BP	0.42	0.001
Diastolic BP	0.36	0.006

Table 6: Thyroid Dysfunction by Gestational Trimester

Trimester	*Number with Dysfunction*
Second trimester	7
Third trimester	14

- Multiple pregnancy
- Chronic renal disease
- Diabetes mellitus
- Autoimmune disorders
- Refusal to participate

Data Collection

All enrolled women underwent:

- Detailed obstetric and medical history
- General and systemic examination
- Blood pressure measurement using standard sphygmomanometer
- Urine protein estimation
- Serum TSH, FT3, FT4 testing by chemiluminescence assay

Definitions

- Gestational hypertension: BP ≥140/90 mmHg after 20 weeks without proteinuria
- Preeclampsia: BP ≥140/90 mmHg with proteinuria or organ dysfunction
- Chronic hypertension: Hypertension before pregnancy or before 20 weeks

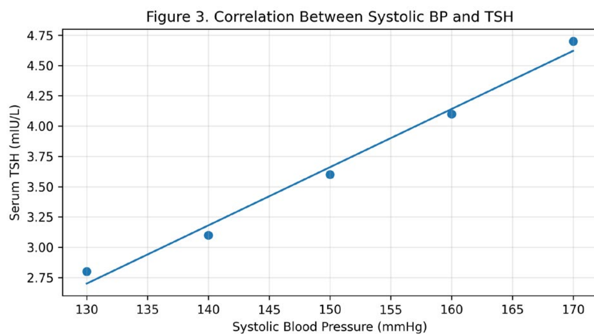

Figure 3: Correlation Trend Between TSH and Systolic BP

Statistical Analysis

Data analyzed using SPSS v26.

- Mean ± SD for continuous variables
- Frequency (%) for categorical variables
- Chi-square test
- Student t-test / ANOVA
- Pearson correlation coefficient
- $p<0.05$ significant

RESULTS

Baseline Characteristics

A total of 60 hypertensive pregnant women were studied. Mean maternal age was 27.8±4.6 years and mean gestational age at enrollment was 31.2±4.1 weeks. Primigravida women constituted 36 (60.0%) cases.

Distribution of Hypertensive Disorders

Gestational hypertension was the most common diagnosis seen in 36 (60.0%) women, followed by preeclampsia in 18 (30.0%) and chronic hypertension in 6 (10.0%) (Table 2, Figure 1).

Thyroid Function Status

Thyroid dysfunction was present in 21 (35.0%) women, while 39 (65.0%) had normal thyroid profile. Subclinical hypothyroidism was the commonest abnormality (Table 3, Figure 2).

Comparison of Thyroid Profile by Hypertension Type

Women with preeclampsia had significantly higher mean TSH levels compared with gestational hypertension and chronic hypertension (p=0.002) (Table 4).

Association Between Blood Pressure and TSH

Serum TSH showed moderate positive correlation with systolic blood pressure (r=0.42, p=0.001) and diastolic blood pressure (r=0.36, p=0.006) (Table 5, Figure 3).

Trimester Distribution of Thyroid Dysfunction

Most thyroid abnormalities were detected during the third trimester (Table 6).

DISCUSSION

The present study demonstrated that thyroid dysfunction is frequent among hypertensive pregnant women, affecting 35.0% of cases. Hypothyroid states, especially subclinical hypothyroidism, constituted the majority of abnormalities. Similar findings have been reported in previous obstetric studies showing increased prevalence of thyroid dysfunction in women with hypertensive disorders of pregnancy.[13,14]

Gestational hypertension was the most common diagnosis in our cohort, followed by preeclampsia. However, women with preeclampsia exhibited significantly higher TSH and lower FT4 values. This supports the hypothesis that impaired thyroid function may be associated with disease severity.[15,16]

Possible mechanisms include endothelial dysfunction, placental ischemia, oxidative stress, and altered angiogenic balance, all of which are shared features of preeclampsia and hypothyroidism.[17]

The positive correlation between systolic blood pressure and TSH observed in the present study suggests a physiological link between thyroid axis disturbance and vascular resistance. Similar correlations have been noted in both pregnant and non-pregnant populations.[18]

Subclinical hypothyroidism accounted for 21.7% of cases. Since these women may remain clinically asymptomatic, biochemical screening becomes important. Untreated maternal hypothyroidism has been associated with adverse fetal neurocognitive development and preterm delivery.[19,20]

Routine universal thyroid screening in pregnancy remains debated. However, targeted screening among high-risk groups such as hypertensive pregnant women may be more practical and cost-effective, particularly in resource-limited settings.[21]

Indian studies have documented regional variations in thyroid dysfunction due to differences in iodine nutrition, autoimmunity, and healthcare access.[22,23] Our findings contribute valuable evidence from Bihar, where such data are limited.

The relatively higher proportion of abnormalities in the third trimester may reflect late presentation, progression of hypertensive disease, or delayed antenatal screening.[24]

Hence, integrating thyroid profile testing into the evaluation of hypertensive pregnancies may help optimize maternal and fetal outcomes.[25]

CONCLUSION

Thyroid dysfunction is common among hypertensive pregnant women, with subclinical hypothyroidism being the predominant abnormality. Women with preeclampsia showed significantly deranged thyroid parameters. Screening of thyroid function in hypertensive pregnancies may facilitate early intervention and improve obstetric outcomes.

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