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Original Research Article

Association of gestational hypertension with hypothyroidism in pregnancy

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ABSTRACT

Background: In recent years, the prevalence of hypothyroidism during pregnancy has been steadily increasing, a trend that is contributing to growing concerns about maternal and fetal health. Alongside the rising prevalence of hypothyroidism in pregnancy, gestational hypertension has emerged as an increasingly common and concerning complication.
Methods: The primary objective was to study the association of gestational hypertension with hypothyroidism in pregnancy and secondary was to assess perinatal outcomes in pregnancies complicated by hypothyroidism. This was a case–control study conducted in 102 cases and 102 controls over a duration of one year in a multispecialty Credence hospital in a urban setting.
Results: In our study, the distribution of age, parity, socioeconomic status, BMI, pre-existing complications- both medical and obstetric problems were comparable between groups . The odds of gestational hypertension were 2.15 times higher in cases compared to controls (OR: 2.15, 95% CI: 1.048–4.411) and this association was statistically significant (p=0.034). The incidence of preterm delivery was higher in hypothyroid women when compared to euthyroid women and was statistically significant OR=4.4 (95% CI: 1.203–16.096) (p=0.016). There was no statistically significant difference in the incidence of preeclampsia, FGR, anaemia, GDM, mode of delivery between the two study groups.
Conclusions: The results of this study provided evidence for an association between hypothyroidism and the development of gestational hypertension offering an understanding of how thyroid dysfunction influences the course of pregnancy, which is consistent with previous studies. Early detection and management of hypothyroidism may help to reduce gestational hypertension and improve overall pregnancy outcomes.

Keywords: Euthyroid, Gestational hypertension, Hypothyroidism, Maternal risk factor

INTRODUCTION

Hypothyroidism in pregnancy refers to an underactive thyroid, where the thyroid gland does not produce sufficient thyroid hormones, particularly thyroxine (T4) and triiodothyronine (T3). Prevalence of hypothyroidism in pregnancy in Indian population is 4.8-12%. The incidence of overt hypothyroidism is 0.2-2.5 % and that of subclinical hypothyroidism is 2-7%. Infact, thyroid antibodies are present in almost 60% of reproductive age women.[1] Vamja et al found that maternal hypothyroidism is associated with a variety of adverse maternal and fetal outcomes and it can significantly affect the hemodynamics during pregnancy.[2]

The relationship between hypothyroidism and pregnancy-related hypertension is not yet fully understood, but thyroid hormones are believed to influence vascular tone and the renin-angiotensin-aldosterone system (RAAS),

which plays a key role in blood pressure regulation.[3] On the other hand, gestational hypertension is a common complication during pregnancy, affecting 5-10% of expectant mothers. Gestational hypertension can lead to severe complications if left untreated, such as preterm birth, fetal growth restriction and placental abruption, maternal obesity, advanced maternal age, multiple gestations and pre-existing hypertension.[4,5]

Given these connections, there is a need to better understand how hypothyroidism contributes to the development and progression of gestational hypertension. Addressing this issue through early diagnosis, monitoring and management of thyroid function could have significant implications for preventing the adverse outcomes associated with both conditions. The increasing prevalence of these disorders in pregnancy highlights the importance of improving screening and treatment protocols to mitigate their impact on maternal and fetal health.

METHODS

This study employed a case-control design to investigate the association between hypothyroidism and gestational hypertension during pregnancy. The case group consists of women who were diagnosed with hypothyroidism whereas control group includes women who had normal thyroid function during pregnancy. This study was conducted in the department of obstetrics and gynecology department in a multispecialty Credence hospital, Kerala after obtaining clearance from the institutional ethical committee and scientific committee.

The study spanned almost 12 months, from February 2024 to February 2025. Women in the case group were having a confirmed diagnosis of hypothyroidism before 20 weeks of gestation –((TSH levels above the normal reference range with low or normal free thyroxine (FT4) levels). Women in the control group were diagnosed as euthyroid, meaning they had normal thyroid function with TSH and FT4 levels within the reference range for pregnant women.

Trimester specific normal reference ranges were used according to ITS guideline 2019. The diagnostic criteria for gestational hypertension will be systolic blood pressure of >=140 mmHg and diastolic blood pressure of >=90 mmHg on two occasions at least 4 hours apart after 20 weeks of pregnancy in a woman with previously normal blood pressure.

Sample size

For this study, the sample size consisted of 102 cases and 102 controls, for a total of 204 participants. Based on the results of probability of exposure in control group (62%), anticipated odds ratio (3.6), probability of exposure in case group (19.22) observed from an existing literature and with 80% power,5% level of significance, the minimum required sample size in each group to be 102.

Exclusion criteria

Multiple pregnancies, history of thyroidectomy, pre-existing hypertension or cardiovascular disease, women who did not give informed consent.

Data collection

A pretested structured proforma was used to gather detailed clinical information from each participant. This form was specifically designed to collect valuable clinical data, including thyroid function tests, blood pressure measurements and medication history. Information on pregnancy complications such as gestational hypertension, preeclampsia, anaemia, gestational diabetes mellitus, oligohydramnios, polyhydramnios, FGR, PPROM, preterm labour was collected. Data regarding onset of labour- spontaneous or induced; mode of delivery-vaginal, caesarean section, complication like post-partum haemorrhage were noted. Additionally, neonatal outcomes such as birth weight, APGAR scores were also recorded.

Statistical analysis

Statistical analysis was done using IBM SPSS Version 20.00 (Chicago USA). Descriptive statistics was used to summarize the demographic and clinical characteristics of the participants in both the case group (hypothyroid pregnancies) and the control group (euthyroid pregnancies). The categorical variables were expressed as percentage or frequencies and the continuous variables as mean with standard deviation. The Pearson chi-square test was used to examine the association of all risk factors with study groups. Logistic regression was employed to estimate the odds ratio (OR) for the risk of developing risk factors in women with hypothyroidism compared to those with normal thyroid function. A p-value less than 0.05 indicated that the results are statistically significant, meaning that the observed differences are unlikely to have occurred by chance.

RESULTS

In the study, the distribution of age, parity, socioeconomic status, BMI, pre-existing complications- both medical and obstetric problems were comparable between the cases and controls. The odds of gestational hypertension were 2.15 times higher in cases compared to controls (OR: 2.15, 95% CI: 1.048–4.411) and this association was statistically significant (p=0.034).The incidence of preterm delivery was higher in hypothyroid women when compared to euthyroid women and was statistically significant OR=4.4 (95% CI: 1.203–16.096) (p=0.016). There was no statistical significant difference in the incidence of preeclampsia, FGR, anemia, GDM, between the two study groups. There was no statistically significant difference in the mode of delivery between cases and controls although low birth weight and Apgar score less than 8 was slightly more common in cases than controls, the difference was not statistically significant (p=0.535 and p=0.263

respectively). Multivariate logistic regression demonstrated that after controlling the effect of confounding factors (age, family h/o of hypothyroidism, family/o of abortion) gestational hypertension and preterm labour were the most significant predictors of hypothyroidism.

Table 1: Trimester specific normal reference range.

Trimester	TSH level (mIU/l)	fT4 level (ng/dl)
1st	<2.5	0.7-2.0
2nd	<3.0	0.5-1.6
3rd	<3.0	0.5-1.6

Table 2: Comparison of socio-demo variables between groups.

Variables		Cases	Controls	P value
Age (in years)	-	30.08±4.46	28.94±4.30	0.06
Socio-economic status (Kuppuswamy scale)	Upper	40 (39.2)	32 (31.4)	0.296
	Upper middle	56 (54.9)	59 (57.8)	
	Lower middle	6 (5.9)	11 (10.8)	
Parity	Primi para	60 (58.8)	64 (62.7)	0.566
	Multi para	42 (41.2)	38 (37.3)	
BMI (Kg/m^2)	Underweight (BMI<18.5)	3 (2.9)	7 (6.9)	0.482
	Normal (BMI 18.5–24.9)	36 (35.3)	37 (36.3)	
	Overweight (BMI 25–29.9)	41 (40.2)	42 (41.2)	
	Obese (BMI≥30)	22 (21.6)	16 (15.7)	

Table 3: Comparison of pre-existing co morbidities.

Variables	Categories	Group		OR (95% CI)	P value
		Cases	Controls		
H/o abortion	Yes	28 (27.5)	18 (17.6)	1.766 (0.904-3.449)	0.094
	No	74 (72.5)	84 (82.4)	1	
Family H/o hypertension	Yes	57 (55.9)	53 (52)	1.171 (0.675-2.035)	0.574
	No	45 (44.1)	49 (48)	1	
Family H/o hypothyroidism	Yes	54 (52.9)	42 (41.2)	1.067 (0.924-2.796)	0.092
	No	48 (47.1)	60 (58.8)	1	

Table 4: Comparison of maternal complications.

Variables	Categories	Group		OR (95% CI)	P value
		Cases	Controls		
Gestational hypertension	Yes	26 (25.5)	14 (13.7)	2.15 (1.048-4.411)	0.034*
	No	76 (74.5)	88 (86.3)	1	
Preterm labour	Yes	12 (11.8)	3 (2.9)	4.4 (1.203-16.096)	0.016*
	No	90 (88.2)	99 (97.1)	1	
Anaemia	Yes	19 (18.6)	10 (9.8)	2.106 (0.926-4.787)	0.071
	No	83 (81.4)	92 (90.2)	1	
GDM	Yes	20 (19.6)	15 (14.7)	1.415 (0.679-2.948)	0.353
	No	82 (80.4)	87 (85.3)	1	
Pre-eclampsia	Yes	3 (2.9)	2 (2)	1.515 (0.248-9.264)	1.00
	No	99 (97.1)	100 (98)	1	
FGR	Yes	11 (10.8)	7 (6.9)	1.641 (0.609-4.416)	0.323
	No	91 (89.2)	95 (93.1)	1	

*Statistically significant

Table 5: Comparison of neonatal outcomes.

Variables	Categories	Group		OR (95% CI)	P value
		Cases	Controls		
Birth weight	Low	15 (14.7)	12 (11.8)	1.293 (0.573-2.919)	0.535
	Normal	87 (85.3)	90 (88.2)	1	
Apgar score	<8	54 (52.9)	46 (45.1)	1.370 (0.790-2.375)	0.263
	≥8	48 (47.1)	56 (54.9)	1	

DISCUSSION

A key finding in our study was the prevalence of gestational hypertension among hypothyroid women, which was higher than among the euthyroid control group. The findings from this study suggested that the odds of gestational hypertension were 2.15 times higher in cases compared to controls (OR: 2.15, 95% CI: 1.048–4.411) and this association was statistically significant (p=0.034). These results were consistent with several studies which have explored the relationship between thyroid dysfunction and hypertensive disorders in pregnancy, with varying results. For instance, in a study by Nirmala C, they found that 35.9% of cases and 12.8% of controls developed gestational hypertension suggesting that hypothyroidism in pregnancy has 3.8 times higher risk of developing gestational hypertension as compared to controls (odds ratio 3.8;95% CI 1.7-8.6; p 0.001).[7] In China, a study by Hua Lai, found that pregnant women with hypothyroidism had a greater risk of GH than women with euthyroidism, according to the logistic regression analysis. In China, a study by Hua Lai, found that pregnant women with hypothyroidism had a greater risk of GH than women with euthyroidism, according to the logistic regression analysis.[6]

Similarly, in a cohort of 68 hypothyroid patients, perinatal outcome in hypothyroid pregnancies by Leung AS concluded that Gestational hypertension--namely, eclampsia, preeclampsia and pregnancy-induced hypertension was significantly more common in the hypothyroid patients than in the general population, with rates of 22, 15 and 7.6%, respectively. In our study we found that the incidence of preterm delivery among hypothyroid cases was higher than among the euthyroid control group. The findings from this study suggested that the odds of preterm delivery were 4.4 times higher in cases compared to controls. In a study by Liu Y, Meta-analysis of 10 studies that provided numbers of preterm infants which revealed a significant association between maternal hypothyroidism in pregnancy and premature delivery, with a combined RR of 1.96 (95% CI: 1.34, 2.88).

Similarly in a study by JAMA et al "The Consortium on Thyroid and Pregnancy Study Group on Preterm Birth" found that Subclinical hypothyroidism had increased the risk of preterm birth, compared to euthyroid women (6.1% vs. 5.0%, respectively). The global rise in hypothyroidism cases is likely due to a combination of factors, including an increase in autoimmune diseases, greater awareness and detection of thyroid dysfunction and lifestyle factors such as poor diet and obesity, all of which can predispose women to thyroid disorders.[8] Thyroid hormones have a significant impact on the control of lipid metabolism and glucose balance. In adults, hypothyroidism is linked to insulin resistance, impaired glucose metabolism and obesity, all of which may be risk factors for type 2 diabetes.[9] In present study, we found that case group had more women with preeclampsia than the control group, but it was not statisticaly significant. (OR=1.515 (95% CI: 0.248–9.264). This findings of our study was comparable with a historical cohort study on 59,643 women with live-born singletons in China in 2021 by Xiujuansu which showed that compared with euthyroid women, those with hypothyroxinemia had an increased risk of preeclampsia-eclampsia (RR=1.16, 95% CI: 1.02-1.31) and the risk increased with the increasing severity of hypothyroxinemia (p for trend<0.001). In our study we found that the case group had 1.64- and 1.29-times higher women of experiencing FGR and low birth weight compared to the control group respectively. This corroborates the findings of a prospective study by Forough Saki that Hypothyroidism was associated with IUGR (p=0.017), it increased the risk of IUGR by 2.2 times and low Apgar score by 1.95 times.[10] Roushali Kuma et al, also suggested significantly higher incidence of emergency lower segment cesarean section (LSCS) in hypothyroid women (48.4%; n=46) as compared to euthyroid women (32.3%; n=64).[11]

In the study, we found that prevalence of GDM in the case group was 19.6% and, in the control, group was 14.7%. In a meta-analysis by Konstantinos A, reporting data on 35,350 pregnant women, they found that the risk of GDM in pregnant women with SCH was found to be substantially higher compared to euthyroid pregnant women (5 studies, pooled unadjusted odds ratio (OR): 1.35, 95% confidence interval (CI): 1.05-1.75.[12] In our study, prevalence of anemia was 18.6% in case group compared to 9.8% in control group. According to a prospective observational study on thyroid function during pregnancy and associated feto-maternal outcome, by Mahadik, in 2020, women with hypothyroidism have a 4.8-fold (95% CI=1.5–15.8) increased risk of anemia compared to those with euthyroidism. Hypothyroidism probably has the potential to make anemia worse.

They also found that women with hypothyroidism have a 6.3-fold increased risk of giving birth to LBW kids (95%

CI=2.03–19.5) compared to those with euthyroidism. Babies born to women with hypothyroidism were 0.14 times (95% CI=0.048–0.39) and 3.6 times (95% CI=1.04–12.7) more likely to be admitted to the NICU and have a low Apgar score than babies delivered to women with euthyroidism.[13]

In the study, we found that prevalence of low apgar score 52.9% and 45.1% respectively in cases and control group. This indicated that incidence of low apgar score was 1.37 times higher in cases group compared to controls, but this was not statistically significant (p=0.263). The prospective cohort study by Vamja R et al, concluded that compared to euthyroid women, hypothyroid women had a higher RR for preterm birth (RR 1.8, 95% CI 1.1–3.0), low APGAR score (RR 2.5, 95% CI 1.5–4.1).[14] Similarly, a prospective observational study from a tertiary care institute in Northern India by Roushali Kuma et al, found that infants with low APGAR scores were significantly more in hypothyroid mothers (11.4%; n=10)) as compared to euthyroid women (7.6%; n=15) (p value<0.05).[15]

One of the primary strengths of this study was its sample size. With 102 hypothyroid cases and 102 controls, the study provided a balanced comparison between hypothyroid women and their euthyroid counterparts. Another strength of the study was of data collection through pretested structured proforma. This data-driven approach ensured that the study could account for relevant maternal and fetal characteristics that could influence the development of gestational hypertension.

However, the study also had limitations that this was hospital-based study. Majority of the study population belonged to urban population. The study did not account for whether women received treatment with levothyroxine or other thyroid hormone replacement therapies.

CONCLUSION

The results of this study provided evidence for an association between hypothyroidism and the development of gestational hypertension offering an understanding of how thyroid dysfunction influences the course of pregnancy, which is consistent with previous studies. Early detection and management of hypothyroidism may help reduce the incidence of gestational hypertension and improve overall pregnancy outcomes. Therefore, we recommend a need for routine thyroid screening in pregnant women.

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REFERENCES

1. Cignini P, Cafà EV, Giorlandino C, Capriglione S, Spata A, Dugo N. Thyroid physiology and common diseases in pregnancy: review of literature. J Prenat Med. 2012;6(4):64-71.
2. Vamja RMY, Patel M, Vala V, Ramachandran A, Surati B, et al. Impact of maternal thyroid dysfunction on fetal and maternal outcomes in pregnancy: a prospective cohort study. Clin Diabetes Endocrinol. 2024;10(1):50.
3. Männistö T, Karumanchi SA, Pouta A, Vääräsmäki M, Mendola P, Miettola S, et al. Preeclampsia, gestational hypertension and subsequent hypothyroidism. Pregnancy Hypertens. 2013;1;3(1):21-7.
4. Sibai B, Dekker G, Kupferminc M. Pre-eclampsia. Lancet. 2005;365(9461):785-99.
5. James R, Cooper, D, Roberts J, Cooper DWPathogenesis and genetics of pre-eclampsia. Lancet. 2001;357:53-6.
6. Lai H, Zhan ZY, Liu H. Association between thyroid hormone parameters during early pregnancy and gestational hypertension: a prospective cohort study. J Int Med Res. 2020;48(2):300060520904814.
7. Nirmala CV, Jayakumari C, Rajasekharan C, Nandini VR. Maternal outcome of hypothyroidism in pregnancy-a south Indian perspective. Am J Clin Med Res. 2014;2(2):47-50.
8. Taylor PN, Albrecht D, Scholz A, Gutierrez-Buey G, Lazarus JH, Dayan CM, et al. Global epidemiology of hyperthyroidism and hypothyroidism. Nat Rev Endocrinol. 2018;14(5):301–16.
9. Huang K, Su S, Wang X, Hu M, Zhao R, Gao S, et al. Association Between Maternal Thyroid Function in Early Pregnancy and Gestational Diabetes: A Prospective Cohort Study. J Clin Endocrinol Metab. 2023;109(2):780–7.
10. Saki F, Dabbaghmanesh MH, Ghaemi SZ, Forouhari S, Ranjbar Omrani G, Bakhshayeshkaram M. Thyroid function in pregnancy and its influences on maternal and fetal outcomes. Int J Endocrinol Metab. 2014;12(4):19378.
11. Kumar R, Bansal R, Shergill HK, Garg P. Prevalence of thyroid dysfunction in pregnancy and its association with feto-maternal outcomes: A prospective observational study from a tertiary care institute in Northern India. Clin Epidemiol Global Health. 2023;19:101201.
12. Toulis KA, Stagnaro-Green A, Negro R. Maternal Subclinical Hypothyroidsm and Gestational Diabetes Mellitus: A Meta-Analysis. Endocr Pract. 2014;20(7):703–14.
13. Mahadik K, Choudhary P, Roy PK. Study of thyroid function in pregnancy, its feto-maternal outcome; a prospective observational study. BMC Preg Childbirth. 2020;10;20(1):769.
14. Vamja RMY, Patel M, Vala V, Ramachandran A, Surati B, et al. Impact of maternal thyroid dysfunction on fetal and maternal outcomes in pregnancy: a prospective cohort study. Clin Diabetes Endocrinol. 2024;10(1):50.

15. Kumar R, Bansal R, Shergill HK, Garg P. Prevalence of thyroid dysfunction in pregnancy and its association with feto-maternal outcomes: A prospective observational study from a tertiary care institute in Northern India. Clin Epidemiol Glob Health. 2023;19:101201.

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