

The prevalence of subclinical thyroid disease in a sample of pregnant women with hypertension during labor: A cross-sectional study

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Abstract

Background and objective: Hypertensive disorders during pregnancy remain one of the major causes of maternal and fetal morbidity and death. Subclinical thyroid disease may play an important underlying cause of hypertension during pregnancy. This study aimed to find out the prevalence of subclinical thyroid disease in a sample of pregnant women with hypertension during labor.

Methods: A cross sectional study was performed at the Maternity Teaching Hospital, Erbil city, Kurdistan region, Iraq, from January to December 2016. Two hundred fifty women were included in this study, all with hypertension related to pregnancy (pregnancy induced hypertension, pre-eclampsia, and eclampsia). The TSH and serum free T4 levels were estimated and the participants were classified to be euthyroid, subclinical hyperthyroid, or subclinical hypothyroid. A specially designed questionnaire was used to collect data.

Results: Of the 250 women included in our study, 191 (76.4%) had TSH levels within the normal range and were considered to be euthyroid, 59 (23.4%) had TSH levels more than 4 milliunits/L meeting the criteria of sub-clinical hypothyroidism. There were no cases of subclinical hyperthyroidism (TSH level below normal).

Conclusion: Subclinical thyroid disease may be a contributory factor in the development of hypertension during pregnancy. No correlation was found between subclinical hyperthyroidism and hypertension during pregnancy.

Keywords: Subclinical thyroid disease; Preeclampsia; Eclampsia; Hypertension; Prevalence.

Introduction

Subclinical thyroid dysfunction (STD), including subclinical hyperthyroidism and subclinical hypothyroidism, is diagnosed biochemically and defined as an asymptomatic condition with normal levels of free thyroxin (FT4) in the presence of primary abnormalities of serum thyroid stimulating hormone (TSH). Until now, the relationship between STD and blood pressure has been controversial and has not received sufficient attention. Several recent studies showed that subclinical hyperthyroidism had no correlation with hypertension, while some community-based investigations stated that the relationship between subclinical hypothyroidism and hypertension was very

similar to the relationship of overt hypothyroidism and increased blood pressure.^{1,2} Many studies suggesting a possible link with subclinical thyroid dysfunction and pregnancy-associated hypertension, there is further evidence of vascular-related sequelae. Specifically, autoimmune thyroid disorders have been associated with an increased risk for placental abruption. These observations, when coupled with the pathologic cardiovascular effects of overtly abnormal increased or decreased thyroid hormone production, prompted the current study to further investigate the prevalence of subclinical thyroid dysfunction in hypertensive pregnant women.³⁻⁶ This study aimed to find out the prevalence of

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subclinical hypothyroidism in a sample of pregnant women with hypertension during labor at the Maternity Teaching Hospital in Erbil, Iraqi Kurdistan Region.

Methods

A cross-sectional study was conducted in the labor room of the Maternity Teaching Hospital in Erbil city from January to December 2016. The proposal to conduct this study was approved by the Ethics and Scientific Committee of the Kurdistan Board of Medical Specialties. Two hundred fifty women were included in this study. They were admitted to the labor room and diagnosed to have hypertension in pregnancy (pregnancy induced hypertension, pre-eclampsia, and eclampsia), with or without treatment. The cause of admission to the labor room was spontaneous labor, induction of labor, or termination of pregnancy. The inclusion criteria were any woman with systolic BP >140 mmHg or diastolic BP > 90 mmHg with gestational age between 24-42 weeks, of any age group, with any BMI and of any parity and accepted to participate in the study. Women with overt thyroid disease and chronic hypertension were excluded from the study. Hypertensive disorders of pregnancy were classified into three types. Pregnancy induced hypertension (PIH) is defined as a persistent blood pressure of 140/90 mmHg after 20 weeks of gestation. Pre-eclampsia (PE) is hypertensive women who had proteinuria of 1+ or more determined by urine dipstick analysis from a catheterized sample with blood pressure higher than 160/110 mmHg. Eclampsia was defined as the onset of seizures (convulsions) in pre-eclamptic women.⁷ Written consent was obtained from all patients after explaining to them the methods and the purpose of the study. A thorough history was taken from the patients to exclude those who were not going with the selected criteria for participation in the study. The data were collected in a special format arranged for this purpose to cover the age of the patient,

obstetrical history, past medical history, gestational age (measured by last menstrual period and approved by early pregnancy ultrasound), the type of hypertension. General, abdominal, and vaginal examinations were performed, and vital signs were checked. About 5.0 ml of peripheral blood was drawn from each woman and transferred into a sterile glass tube. Samples were kept in an ice chamber following collection and during transportation to the laboratory. After centrifugation, serum samples were collected in micro centrifuge tubes and stored at -20°C until estimation of TSH and T4 level. This procedure was done in a private laboratory clinic, and the results were obtained within 48 hours as a range. Normal ranges used for TSH levels were 0.04 to 4 m U/L. Women with serum TSH levels within the normal range were considered to be euthyroid. Those with an abnormally low serum TSH < 0.04 m U/L were classified as having subclinical hyperthyroidism. Women with abnormally high TSH levels > 4 m U/L were classified as having subclinical hypothyroidism.^{8,9} Data were analyzed using the Statistical Package for Social Sciences (SPSS, version 22). Means and standard deviations were used to summarize the numerical variables. The categorical variables were presented as frequencies and proportions. The Chi-square test of association was used to compare proportions. Fisher's exact test was used when the expected count of more than 20% of the cells of the table was less than 5. A *P* value of ≤ 0.05 was considered as statistically significant.

Results

Two hundred fifty hypertensive pregnant women participated in the study. Their mean age (\pm SD) was 28.11 \pm 5.96 years, ranging from 17 to 40 years. The median was 28.5 years. Table 1 shows that around half of them were in the age range 25-34 years, and the majority (74.8%) were multi-parous women.

Regarding the gestational age, it was less than 32 weeks in 16% of the women, 32-35 weeks in 39.2% of the women, and it was 36-39 weeks among the

rest of the sample (Table 1). Figure 1 shows that the prevalence of sub-clinical hypothyroidism was 23.6%.

Table 1: Basic characteristics of the study sample.

	No.	(%)	Mean	(±SD)
Age (years)				
< 25	83	(33.2)	28.11	(±5.96)
25-34	127	(50.8)		
≥ 35	40	(16.0)		
Parity				
Primi-para	50	(20.0)	1.87	(±1.50)
Multi-para	187	(74.8)		
Grand Multi-para	13	(5.2)		
Gestational age (weeks)				
< 32	40	(16.0)	34.60	(±3.22)
32-35	98	(39.2)		
36-39	112	(44.8)		
Total	250	(100.0)		

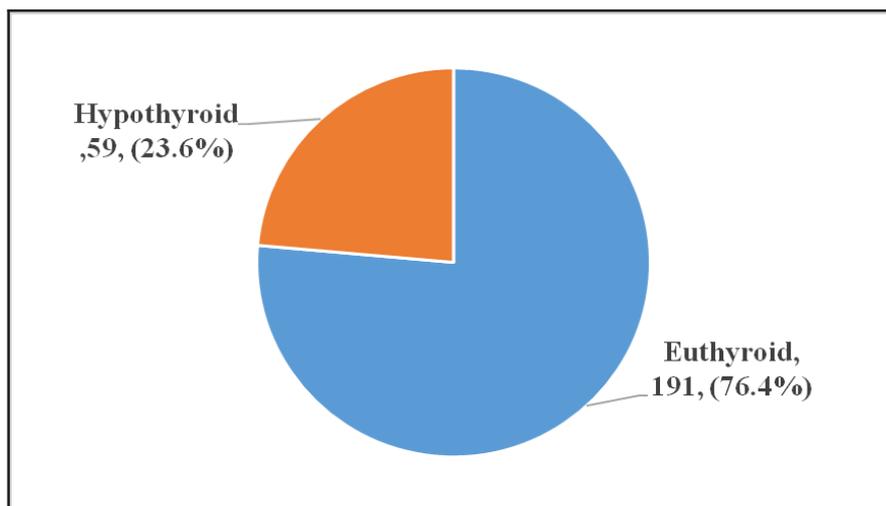


Figure 1: Prevalence of sub-clinical hypothyroidism.

Table 2 shows no significant association between the prevalence of subclinical hypothyroidism with age ($P = 0.157$), parity ($P = 0.719$), gestational age ($P = 0.571$),

smoking ($P = 0.185$), multiple pregnancy ($P = 0.559$), and educational level ($P = 0.288$).

Table 2: Prevalence of sub-clinical hypothyroidism by the studied variables.

	Euthyroid		Subclinical Hypothyroidism		Total		P value
	No.	(%)	No.	(%)	No.	(%)	
Age							
< 25	61	(73.5)	22	(26.5)	83	(100.0)	0.157
25-34	103	(81.1)	24	(18.9)	127	(100.0)	
≥ 35	27	(67.5)	13	(32.5)	40	(100.0)	
Parity							
Primi	39	(78.0)	11	(22.0)	50	(100.0)	0.719
Multi	141	(75.4)	46	(24.6)	187	(100.0)	
Grand Multi	11	(84.6)	2	(15.4)	13	(100.0)	
GA							
< 32	29	(72.5)	11	(27.5)	40	(100.0)	0.571
32-35	73	(74.5)	25	(25.5)	98	(100.0)	
36-39	89	(79.5)	23	(20.5)	112	(100.0)	
Smoking							
Non-smoker	176	(77.5)	51	(22.5)	227	(100.0)	0.185
Smoker	15	(65.2)	8	(34.8)	23	(100.0)	
Multiple pregnancy							
Single	179	(76.8)	54	(23.2)	233	(100.0)	0.559*
Multiple	12	(70.6)	5	(29.4)	17	(100.0)	
Educational level							
Illiterate	14	(70.0)	6	(30.0)	20	(100.0)	0.288
Primary	90	(78.3)	25	(21.7)	115	(100.0)	
Secondary	64	(71.9)	25	(28.1)	89	(100.0)	
High school	23	(88.5)	3	(11.5)	26	(100.0)	
Total	191	(76.4)	59	(23.6)	250	(100.0)	

*By Fisher's exact test

Table 3 shows a significant association between the prevalence of subclinical hypothyroidism and the type of hypertension ($P < 0.001$). The prevalence was 10.8% among patients with pregnancy induced hypertension, 29.9% among those with pre-eclampsia, and 47.6% among patients with eclampsia.

Discussion

Different factors may play an important role in the development of different types of hypertension during pregnancy. The etiology of hypertensive disorders of pregnancy is clearly unknown, and it may occur at the second or third trimester of pregnancy. Some showed an association between the levels of thyroid hormones and the development of hypertension during pregnancy.¹⁰ In this study, we found that 23.6% (59 of 250) had subclinical hypothyroidism (high TSH level), all of them with hypertension despite treatment, with a history of pregnancy induced hypertension, pre-eclampsia, and eclampsia. The remaining patients had a normal TSH level, so regarded as euthyroid. No cases of subclinical hyperthyroidism were found. Some studies have shown that there were no significant differences in TSH levels between pre-eclampsia and healthy women which is different from our results.¹¹ Other research found that the increased level

of TSH in pre-eclamptic women shows an association with the risk for the development and severity of pre-eclampsia.¹² Many studies indicated that pre-eclamptic women showed significantly increased or no significant elevated level of TSH, this alteration may occur as a result of the association of increased level of TSH with thyroid peroxidase antibodies, 78% of severely pre-eclamptic women had raised TSH level as compared with only 32% of women with mild pre-eclampsia. 13 Thyroid dysfunction may change thyroid hormone secretion which can significantly increase T3 and T4 levels in severe pre-eclamptic women.¹³ Thyroid hormone may affect hypertensive disorders onset in pregnant women. An elevated level of thyroid hormones can be the cause of endothelial cell dysfunction, which has an important role in the pathophysiology of hypertensive diseases during pregnancy.¹⁴ Another study found that subclinical hyperthyroid women who had the lowest TSH levels had an incidence of hypertensive disorders of 6.2% compared 8.5% of euthyroid women and 10.9% of subclinical hypothyroid women.¹⁵ The research done by Sahu et al. show results similar to this study, he found that subclinical hypothyroidism among the Indian pregnant women had increased risk of pre-eclampsia in comparison to euthyroid women, 21.8% of women with

Table 3: Prevalence of sub-clinical hypothyroidism by type of hypertension.

Type of hypertension	Euthyroid		Subclinical Hypothyroidism		Total		P value
	No.	(%)	No.	(%)	No.	(%)	
Pregnancy induced hypertension	91	(89.2)	11	(10.8)	102	(100.0)	
Pre-eclampsia	89	(70.1)	38	(29.9)	127	(100.0)	< 0.001
Eclampsia	11	(52.4)	10	(47.6)	21	(100.0)	
Total	191	(76.4)	59	(23.6)	250	(100.0)	

subclinical hypothyroidism and 41.7% of women with overt hypothyroidism had pre-eclampsia in the study group in comparison to 8.2% of euthyroid.¹⁶ Women who experienced pre-eclampsia might have an increased risk for reduced thyroid functions later in life.¹⁷

Conclusion

Subclinical hypothyroidism could be a contributory factor for the development of hypertension during pregnancy as subclinical hypothyroidism were found in patients with hypertensive disorders during pregnancy.

Competing interests

The authors declare no competing interests.

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