ORIGINAL RESEARCH

Correlation of thyroid status with severity of hypertension in pregnancy- A clinical study

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ABSTRACT

Background: Hypertension, a prevalent medical disease that often raises hospitalization and death risks for both the mother and the fetus, affects about 10% of pregnant women. The present study was conducted to evaluate correlation of thyroid status with severity of hypertension in pregnancy. **Materials & Methods:** 70 hypertensive pregnant women were kept in group I and healthy control in group II. TSH, FT3 and FT4, severity of hypertension etc. were recorded in both groups. **Results:** The mean gestational age was 28.4 weeks in group I and 28.7 weeks in group II. BMI was 27.3 kg/m2 in group I and 26.2 kg/m2 in group II. SBP was 160.4 mmHg in group I and 120.4 in group I and DBP was 90.6 in group I and 76.2 in group II. The mean TSH level in group I was 4.3 µIU/ml and in group II was 2.3 µIU/ml. FT3 level was 3.1pg/ml in group I and 4.5pg/ml in group II. FT4 was 2.9 ng/dl in group I and 2.5 ng/dl in group II. The difference was significant (P< 0.05). Gestational hypertension was seen in 23, mild preeclampsia in 37 and severe preeclampsia in 10 patients. The difference was significant (P< 0.05). There was statistically significant positive correlation between systolic blood pressure (SBP) and diastolic blood pressure (DBP), as well as between SBP and thyroid stimulating hormone (TSH). There was inverse relationships between TSH and FT3, between TSH and FT4. There was no statistically significant positive relationship observed between systolic blood pressure (SBP) and free triiodothyronine (FT3), SBP and free thyroxine (FT4), diastolic blood pressure (DBP) and FT3, DBP and FT4 as well as FT3 and FT4. **Conclusion:** There was a strong link between pregnancy-induced hypertension and thyroid hypofunction.

Keywords: gestational hypertension, thyroid function, thyroid stimulating hormone

INTRODUCTION

Hypertension, a prevalent medical disease that often raises hospitalization and death risks for both the mother and the fetus, affects about 10% of pregnant women. Eclampsia, gestational hypertension, and chronic hypertension are among the many distinct conditions that are classified as pregnancy-related hypertension diseases.[1] Pregnancy-related hypertension can be classified into four categories, according to the National High Blood Pressure Education Program Working Group on High Blood Pressure in Pregnancy: Pregnant hypertension, preeclampsia-eclampsia, preeclampsia on top of chronic hypertension, and chronic hypertension are the four conditions.There is currently little evidence available regarding the danger of thyroid dysfunction in relation to the health of mothers and newborns, despite the significant burden that thyroid dysfunction poses. Elevated arterial pressure that is higher than normal is a defining feature of the medical disorder known as hypertension, or high blood pressure.[2]

The development of serious illnesses and organ damage are just two of the negative consequences that could result from this extremely high blood pressure.[3] With a blood pressure reading of 140/90 mmHg or above, hypertension is one of the most prevalent chronic conditions. Pregnancy-related high blood pressure has been linked to several physiological

impacts and can increase a mother's susceptibility to issues before to, during, or following childbirth.[4]Pregnant women who have thyroid abnormalities, especially hyperthyroidism and hypothyroidism, run the risk of developing hypertension and other related health issues for both the mother and the fetus. An higher risk of miscarriage, pregnancy-induced hypertension, premature birth, placental abruption, low birth weight, and fetal death are among the adverse health outcomes associated with this condition.[5]The present study was conducted to evaluate correlation of thyroid status with severity of hypertension in pregnancy.

MATERIALS & METHODS

The present study was conducted on 70 hypertensive pregnant womenage ranged 18 to 40 years.All were informed regarding the study and their written consent was obtained.

Data such as name, age, etc. was recorded. Hypertensive pregnant women were kept in group I and healthy control in group II. TSH, FT3 and FT4, severity of hypertension etc. were recorded in both groups. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Assessment of parameters

Parameters	Group I	Group II	P value
Gestational age (weeks)	28.4	28.7	0.91
BMI (kg/m2)	27.3	26.2	0.48
SBP (mmHg)	160.4	120.4	0.01
DBP (mmHg)	90.6	76.2	0.04
TSH (µIU/ml)	4.3	2.3	0.03
FT3 (pg/ml)	3.1	4.5	0.01
FT4 (ng/dl)	2.9	2.5	0.53

Table I shows that mean gestational age was 28.4 weeks in group I and 28.7 weeks in group II. BMI was 27.3 kg/m2 in group I and 26.2 kg/m2 in group II. SBP was 160.4 mmHg in group I and 120.4 in group I and DBP was 90.6 in group I and 76.2 in group II. The mean TSH level in group I was 4.3 µIU/ml and in group II was 2.3 µIU/ml. FT3 level was 3.1pg/ml in group I and 4.5pg/ml in group II. FT4 was 2.9 ng/dl in group I and 2.5 ng/dl in group II. The difference was significant (P< 0.05).

Table II Severity of hypertension

Severity	Number	P value
Gestational hypertension	23	0.05
Mild preeclampsia	37	
Severe preeclampsia	10	

Table II, graph I shows that gestational hypertension was seen in 23, mild preeclampsia in 37 and severe preeclampsia in 10 patients. The difference was significant (P< 0.05).

Graph I Assessment of severity of hypertension

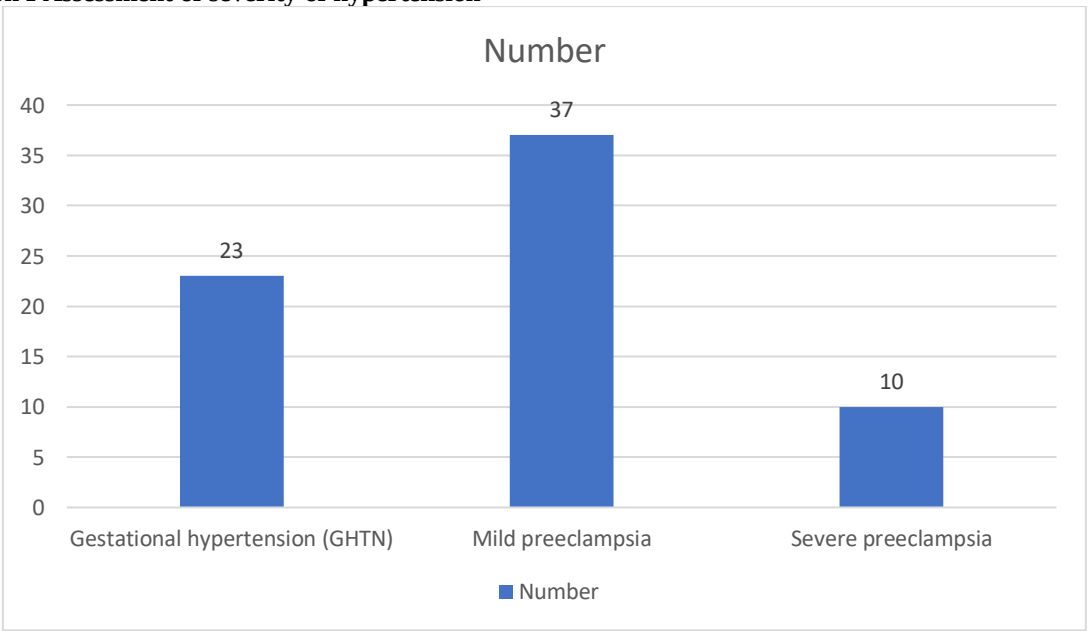

Table III Correlation between SBP, DBP, TSH, FT3 and FT4

Thyroid status	SBP	DBP	TSH	FT3	FT4
SBP	-	1.35	0.93	0.08	0.03
DBP	1.35	-	1.30	0.06	0.01
FT3	0.07	0.08	0.67	-	
FT4	0.09	0.07	0.09	0.05	-
TSH	0.87	1.24	-	0.68	0.45

Table III shows that there was statistically significant positive correlation between systolic blood pressure (SBP) and diastolic blood pressure (DBP), as well as between SBP and thyroid stimulating hormone (TSH). There was inverse relationships between TSH and FT3, between TSH and FT4. There was no statistically significant positive relationship observed between systolic blood pressure (SBP) and free triiodothyronine (FT3), SBP and free thyroxine (FT4), diastolic blood pressure (DBP) and FT3, DBP and FT4 as well as FT3 and FT4.

DISCUSSION

Elevated arterial pressure that is higher than normal is a defining feature of the medical disorder known as hypertension, or high blood pressure.[6] The development of serious illnesses and organ damage are just two of the negative consequences that could result from this extremely high blood pressure.[7,8] A blood pressure reading of 140/90 mmHg or above is known as hypertension, and it is one of the most prevalent chronic conditions.[9,10] The present study was conducted to evaluate correlation of thyroid status with severity of hypertension in pregnancy.

We found thatmean gestational age was 28.4 weeks in group I and 28.7 weeks in group II. BMI was 27.3 kg/m2 in group I and 26.2 kg/m2 in group II. SBP was 160.4 mmHg in group I and 120.4 in group I and DBP was 90.6 in group I and 76.2 in group II. The mean TSH level in group I was 4.3 µIU/ml and in group II was 2.3 µIU/ml. FT3 level was 3.1pg/ml in group I and 4.5pg/ml in group II. FT4 was 2.9 ng/dl in group I and 2.5 ng/dl in group II. Swati et al[12] discovered that women were more likely to have hypertension disorders and the risk factors that go along with it. In the study, preeclampsia was 6% and HDP was 17% prevalent. Significant risk factors for HDP development in the study population included a history of preeclampsia ($P < 0.001$; Relative risk (RR) 4.2; confidence interval (CI) 2.144-6.812), multiple gestation ($P < 0.03$; RR 3.8; CI 1.037-6.235), gestational diabetes ($P < 0.02$; RR 4.8; CI 1.910-6.751), and obesity ($P < 0.002$; RR 2.7; CI 1.373-5.511).

We found that gestational hypertension was seen in 23, mild preeclampsia in 37 and severe preeclampsia in 10 patients. The fetomaternal outcome of preeclampsia with concurrent thyroid dysfunction was examined by Banik et al.[13] Thyroid dysfunction was present in 42 (44.2%) of the 95 preeclamptic patients. Of these 42 patients, 4 (4.2%) had overt hypothyroidism, 1 (1%) had hyperthyroidism, and 37 (38.9%) had subclinical hypothyroidism. Compared to 39.6% of euthyroid patients, 64.3% of patients with thyroid dysfunction had severe preeclampsia. When comparing severe preeclampsia to non-severe preeclampsia, the mean levels of thyroid stimulating hormone (TSH) and free thyroxine (fT4) were significantly higher and lower, respectively. Preterm deliveries, postpartum hemorrhage (PPH), low birth weight babies, birth asphyxia in babies, oligohydramnios, abruption, intrauterine fetal death (IUD), intrauterine growth restriction (IUGR), and subsequent admissions to the neonatal intensive care unit (NICU) were among the complications that were substantially more common in the preeclampsia patients with thyroid dysfunction in comparison with euthyroid ones.

In our study, there was statistically significant positive correlation between systolic blood pressure (SBP) and diastolic blood pressure (DBP), as well as between SBP and thyroid stimulating hormone (TSH). There was inverse relationships between TSH and FT3, between TSH and FT4. There was no statistically significant positive relationship observed between systolic blood pressure (SBP) and free triiodothyronine (FT3), SBP and free thyroxine (FT4), diastolic blood pressure (DBP) and FT3, DBP and FT4 as well as FT3 and FT4. Kumari et al[14]conducted a study to see the possible relationship between preeclampsia andthyroid dysfunction. No of clinical hypothyroid cases were 12% in severe preeclampsia and while there was no case of clinical hypothyroidism in gestational hypertension.In sub clinical hypothyroid cases was 48% & 20% of severe preeclampsia and gestational hypertension respectively.

The limitation of the study is small sample size.

CONCLUSION

Authors found that thyroid hypofunction and pregnancy-induced hypertension were strongly correlated.

REFERENCES

1. Minire A, Mirton M, Imri V, Lauren M, Aferdita M. Maternal complications of preeclampsia. Med Arch. 2013;67(5):339-41.
2. Hajifoghaha, M., Teshnizi, S.H., Forouhari, S. et al. Association of thyroid function test abnormalities with preeclampsia: A systematic review and meta-analysis. BMC EndocrDisord 2022; 22: 240.
3. Fabry I.G., Richart T., Cheng X., Van Bortel L.M., Staessen J.A. Diagnosis and treatment of hypertensive

disorders during pregnancy. Acta Clin. Belg. 2010;65:229–23619.
4. Watkins E.J., Saldanha C. Hypertensive Disorders of Pregnancy. JAAPA. 2019;32:42–43.
5. Manjusha Sajith, Vandana Nimbargi, Amit Modi, Ronak Sumariya, Atmaram Pawar. Incidence of pregnancy induced hypertension and prescription pattern of antihypertensive drugs in pregnancy. International Journal of Pharma Sciences and Research;2014;5(4):163-168.
6. Khaliq F, Singhal U, Arshad Z, Hossain MM. Thyroid function in preeclampsia and its correlation with maternal age, parity, severity of blood pressure and serum albumin. Indian J PhysiolPharmacol. 1999;43:193-8.
7. Osathanordh R, Tulchinsky D, Chopra IJ. Total and free thyroxine and triiodothyronine in normal and complicated pregnancy. J ClinMetab. 1976; 42:98-104.
8. Khanam M, IIias M, Study of Thyroid hormonal Status in Preeclampsia, Medicine Today, 2013; 25:22.
9. Swapan Das, Debasish Char, Sanjay Sarkar, Tushar Kanti Saha, Sucheta Biswas, Evaluation of Thyroid Hormone Changes in Non-Pregnant, Normotensive Pregnant and Pregnancy with Preeclampsia, JOSR Journal of Dental and Medical Sciences (IOSR-JDMS) 2013;11(6):16-18.
10. Nanda S, Sardana D, et al. Correlation of thyroid functions with severity and outcome of pregnancy. Annals of Medical and Health Sciences Research 2013; 43-61.
11. Lakshmi P, Bakiavathy P. Correlation of thyroid status with severity of hypertension in pregnancy. Int J Acad Med Pharm. 2023;5(4):587-91.
12. Swati S, Ekele BA, et al. Hypertensive disorders in pregnancy among pregnant women in a Nigerian Teaching Hospital. Nigerian Medical Journal 55 (2014): 15-17.
13. Banik P, Devi RK, Bidya A, Tamphasana A, Agalya M, Singh LR. Thyroid dysfunction in preeclampsia and related fetomaternal outcomes. Int J Reprod Contracept Obstet Gynecol. 2019 May 1;8(5):1928-33.
14. Rani Kumari, Kumari Archana, Roopam Singh, Rita Tirkey. Correlation of thyroid status with severity of hypertension in pregnancy.International Journal of Health and Clinical Research, 2021;4(10):35-39.