Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 7s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Association Of Thyroid Hormone Level With Severity Of Preeclampsia

Prerna Harsh[1*], Ajay Kumar[2], Swaranjeet Soni[3]

[1*]Research Scholar, Department of Biochemistry, Sai Tirupati University, Udaipur.

[2]Associate professor, Department of Biochemistry, Pacific Institute of Medical Sciences, Udaipur.

[3]Professor and Head, Department of Biochemistry, Maharaja Agrasen Medical College, Agroha.

***Corresponding Author**

Prerna Harsh

Research Scholar, Department of Biochemistry, Sai Tirupati University, Udaipur.

Email ID : prernaharsh96@gmail.com

Cite this paper as: Prerna Harsh, Ajay Kumar, Swaranjeet Soni, (2025) Association Of Thyroid Hormone Level With Severity Of Preeclampsia. *Journal of Neonatal Surgery*, 14 (7s), 789-792.

ABSTRACT

Background: Preeclampsia is a major cause of maternal and perinatal mortality globally. Thyroid hormones are essential for a healthy pregnancy, and their dysfunction can increase the risk of preeclampsia. The objective of the study was to correlate thyroid hormone with the severity of pre-eclampsia.

Method: This study was designed on 140 clinically diagnosed Preeclamptic women in third trimester of pregnancy which was taken from OPD and IPD of Obstetrics and Gynaecology Department of Maharaja Agrasen Medical College, Agroha. Out of them 70 was mild preeclamptic and 70 was severe preeclamptic women. Thyroid hormone (Serum T3, T4 and TSH) measured by an enzyme-linked fluorescent immunoassay (ELFA).

Results: The mean serum T3 and T4 levels were higher in mild preeclampsia compared to severe preeclampsia, but the difference was statistically non-significant ($p>0.05$). In contrast, the mean TSH level was significantly higher in severe preeclampsia ($p<0.05$). Gravidity did not significantly affect thyroid hormone levels ($P>0.05$). Thyroid dusfunction was more prevalent in the severe preeclampsia group, with a higher number of cases showing subclinical and overt hypothyroidism.

Conclusion: Our findings suggest a potential association between thyroid dysfunction and the severity of preeclampsia. Thyroid hormone levels could serve as a useful screening marker for assessing the severity of preeclampsia..

1. INTRODUCTION

Pregnancy Induce Hypertension (PIH) is raised blood pressure without proteinuria during the second half of pregnancy. Preeclampsia is a multisystem disorder, unique to pregnancy that is usually associated with raised blood pressure and proteinuria after 20 weeks of gestation. Eclampsia is one or more convulsions in association with syndrome of preeclampsia.(1,2)

Clinically preeclampsia is characterized by persistently elevated blood pressure of greater than 140/90 mmHg, proteinuria and oedema.It may be associated with complications like visual disturbances, oliguria, eclampsia, hemolysis, elevated liver enzymes, thrombocytopenia, pulmonary oedema and foetal growth restriction.(3)

During pregnancy, there is an increased thyroid demand and increased iodine uptake and synthesis of thyroid hormones. Estrogen induces a rise in serum TBG and the placenta releases several thyroid stimulatory factors in excess e.g. hCG. Alpha subunit of hCG is identical to that of TSH and has weak thyrotropic activity.(4)

Preeclampsia also affects the normal functioning of the thyroid gland.(5) In general, the findings were not the same in all studies. For example, in one study, despite increased in TSH levels, T3 and T4 levels did not change notably in women with preeclampsia.(6) The findings of two studies revealed that TSH, FT4, and FT3 were not differ significantly between preeclamptic and normal pregnant women.(7,8)American Tyroid Association (ATA) guidelines report that there is no association between changes in thyroid function tests and preeclampsia.(9) Some researcher found that preeclamptic women had higher incidence of the increase in TSH and low T4 in a comparison with normal pregnant women.(8)

The aim of our study was to evaluate the thyroid hormone as markers for severity of preeclampsia in late pregnancy and find out its association with Gravidity.

2. MATERIAL AND METHODS:

This study was carried out in Department of Biochemistry in association with the Department of Obstetrics and Gynaecology,

Maharaja Agrasen Medical College, Agroha. Institutional ethics committee clearance had taken before starting the study. 70 clinically diagnosed mild and 70 clinically diagnosed severe Preeclamptic women in third trimester of pregnancy of the age between18-35 year were enrolled in this study. Study group was categorized in mild and severe cases according to American college of Obstetrics and Gynaecology (ACOG)(3)

Smoker, alcoholic, Past history of hypertension, Chronic Kidney Disease and Diabetes Mellitus and women with multiple gestations were excluded from the study.

Estimation of serum T3, T4 and TSH was done on the instrument of VIDAS family by an automated enzyme-linked fluorescent immunoassay for the quantitative determination.

Statistical analysis

Data were presented as Mean ± Standard Deviation (SD). Student t test was used to compare two groups. One-way ANOVA was used to compare the means of multiple groups. The level of significance was $p<0.05$ for all comparisons.

RESULTS:

Table 1 shows comparison of serum T3, T4 and TSH level among study group.

Parameters	Mild Preeclamptic (Mean ± SD)	Severe Preeclamptic (Mean ± SD)	Significance
Serum T3	3.56±1.05	3.63±1.10	0.6989
Serum T4	12.74±2.70	12.31±2.89	0.3701
Serum TSH	3.21±2.02	4.43±4.18	0.0294

Table 2 shows comparison of serum T3, T4 and TSH level in preeclamptic women with gravidity.

Parameters	Mild Preeclamptic		Severe Preeclamptic		Significance
	Primigravid	Multigravid	Primigravid	Multigravid	
Serum T3	3.59±1.02	3.51±1.11	3.79±1.05	3.45±1.15	0.5714
Serum T4	12.43±2.23	13.20±3.29	12.24±2.60	12.40±3.23	0.5557
Serum TSH	3.11±1.64	3.36±2.52	3.81±3.83	5.12±4.50	0.0557

Table 3 shows Distribution of thyroid status among study groups.

Thyroid status	Mild preeclampsia	Severe preeclampsia
Euthyroid	67	53
Subclinical hypothyroidism	1	4
Overt hypothyroidism	2	13
Total	70	70

As shown in table:1 the mean serum T3 and T4 level was higher in mild preeclampsia compared to severe preeclampsia, the difference between the two groups was statistically non-significant for both T3 and T4 ($p > 0.05$).The mean TSH level was higher in severe preeclampsia compared to mild preeclampsia, the difference between the two groups was statistically significant ($p<0.05$).

As shown in table:2 the highest mean serum T3 level was observed in the primigravid women with severe preeclampsia, the highest mean serum T4 level was observed in the multigravid women with mild preeclampsia and the highest mean serum TSH level was observed in the multigravid women with severe preeclampsia, The difference between serum T3, T4 and TSH in primigravid and multigravid women with mild and severe preeclampsia was statistically non-significant($p>0.05$).

As shown in table:3 in the mild preeclampsia group, the majority of patients (67 out of 70) have normal thyroid function (euthyroid), with only a small fraction showing subclinical (1 case) or overt hypothyroidism (2 cases). In contrast, the severe preeclampsia group also has a majority of euthyroid patients (53 out of 70), but there is a more pronounced presence of thyroid dysfunction, with 4 cases of subclinical hypothyroidism and 13 cases of overt hypothyroidism.

DISCUSSION:

Sardana *et al*[10]found higher TSH levels in both preeclamptic & normotensive pregnant women compared to nonpregnant women.Similar to our data non significant T3 and T4observations and significant difference in TSH found between mild and severe cases have been reported by Muraleedharan et al[11]and Mousa et al.[12]found thyroid stimulating hormone (TSH) was higher in severe PE patients than in those with mild PE and controls. The T3 level was significantly lower in PE than normal healthy women with a lower level of severity than mild PE. Thyroid hormone T4 were also decreased in PE women than normal pregnant but the differences did not reach the statistical significance.

Alavi A et al[13] also found non significant difference between T3, T4 and TSH between GestationalHTN, Mildpreeclampsia, Severepreeclampsia and Eclampsia. Our study did not align with the findings of Rafeeinia et al[14], they found non significantly higher TSH was in mild PE and significantly high T3 and T4 was found in severe preeclampsia.

Tolino et al[15] suggested that TSH levels 5 μIU/mL carry a higher risk of development of preeclampsia. Lao *et al*[16] also suggest that mild biochemical hypothyroidism may be found in proteinuric pre-eclampsia, and the concentrations of TT4, TT3, FT3 and TSH may reflect the severity of pre-eclampsia.But Aparna et al[17]concluded that severity of preeclampsia was not associated with thyroid hormone.

Our findings are in agreement with the study conducted by Kharb et al[18],Despande et al[19]. Despande et al[19], also reported that severe preeclampsia patients had 2.87 times more chances of thyroid hypofunction. Wilson et al[20] found significant association between subclinical hypothyroidism and severe preeclampsia. In our study most common thyroid dysfunction was sub clinical hypothyroidism, supporting the findings of the present study by Bankowska et al[21] and Kharb S et al.[18]

The cardiovascular effects of abnormal concentration of thyroid hormones like ventricular hypertrophy leading to heart failure.[22] These aberrations follow long term exposure to excessive or decreased thyroid hormones.[23] Subclinical hypothyroidism might cause endothelial dysfunction characterised by diminished nitric oxide production with impaired vasorelaxation which might cause hypertension.[24] Hypothyroidism might also cause vascular smooth muscle contraction, leading to increased diastolic hypertension, peripheral vascular resistance and decreased tissue perfusion.[25]

3. CONCLUSION:

In conclusion, this study shows that while serum T3 and T4 levels did not show significant difference in mild and severe preeclampsia, TSH levels are significantly higher in severe preeclampsia. Gravidity does not significantly affect the thyroid function. Most women in both groups are euthyroid, but thyroid dysfunction, particularly overt hypothyroidism, is more prevalent in the severe preeclampsia group. These findings suggest a potential association between thyroid dysfunction and the severity of preeclampsia.

REFERENCES

1. National High Blood Pressure Education Program Working Group on High Blood Pressure in Pregnancy. Report of the National High Blood Pressure Education Program Working Group on High Blood Pressure in Pregnancy. Am J Obstet Gynecol. 2000;183(1 Suppl):S1–22.
2. Davey DA, MacGillivray I. The classification and definition of the hypertensive disorders of pregnancy. Am J Obstet Gynecol. 1988;158:892–8.
3. Cunningham FG, Leveno KJ, Bloom SL, Hauth JC, Gilstrap LC III, Wenstrom KD. Williams Obstetrics. 22nd ed. New York: McGraw-Hill; 2005. p. 761–808
4. Brent GA. Maternal thyroid function: interpretation of thyroid function tests in pregnancy. Clin Obstet Gynecology. 1997;40:3–15. doi: 10.1097/00003081-199703000-00004
5. Sadiq AM, Yousif MG, Mohammed FA, Aladly SH, Hameed HH. Subclinical hypothyroidism with preeclampsia. Res J Pharm Biol Chem Sci. 2016;7(3):1536-44.
6. Thanna RC, Nigoskar S. Association of TSH (Thyroid Stimulating Hormone) with Preeclampsia as a Diagnostic Indicator. Int J Health Sci Res. 2015;5(6):107–110.
7. Sattar R, Ahmed E, Abbasi SQ. Thyroid Hormones Pattern in Preeclampsia. Ann King Edward Med Univ Lahore Pakistan. 2018;24:863–866.
8. Khadem N, Ayatollahi H, Vahid Roodsari F, Ayati S, Dalili E, Shahabian M et al. Comparison of serum levels of Tri-iodothyronine (T3), Thyroxine (T4), and Thyroid-Stimulating Hormone (TSH) in preeclampsia and normal pregnancy. Iran J Reprod Med. 2012 Jan;10(1):47-52.
9. Alexander EK, Pearce EN, Brent GA, Brown RS, Chen H, Dosiou C et al. Guidelines of the American Thyroid Association for the Diagnosis and Management of Thyroid Disease During Pregnancy and the Postpartum. Thyroid. 2017;27(3):315-389.
10. Sardana D, Nanda S, Kharb S. Thyroid hormones in pregnancy and preeclampsia J Turk Ger Gynecol Assoc. 2009;10:168–71.
11. Muraleedharan N, Janardhanan JS. Thyroid hormone status in preeclampsia patients: A case–control study. Muller J Med Sci Res. 2017;8(2):68-73.
12. Mousa BA. Detection of relationship between maternal thyroid hormones and severity of preeclampsia. Int J Med Res Health Sci. 2018;7(9):127-31.
13. Alavi A, Adabi K, Nekuie S, Jahromi EK, Solati M, Sobhani A, Karmostaji H, Jahanlou AS. Thyroid dysfunction and autoantibodies association with hypertensive disorders during pregnancy. J Pregnancy. 2012;2012:742695.
14. Rafeeinia A, Teymoori H, Marjani A. Serum thyroid hormone levels in preeclampsia women in Gorgan. J Med

Sci. 2015;15(1):38-43.

15. Tolino A, de Conciliis B, Montemagno U. Thyroid hormones in the human pregnancy Acta Obstet Gynecol Scand. 1985;64:557–9.
16. Lao TT, Chin RK, Swaminathan R, Lam YM. Maternal thyroid hormones and outcome of pre-eclamptic pregnancies Br J Obstet Gynaecol. 1990;97:71–4.
17. Aparna S, Sheela SR, Dayanand CD, Sivaraj N. Evaluation of maternal thyroid hormone status and atherogenic potency in pre eclampsia in Kolar District - a South West of India. Br J Med Med Res. 2015;10(4):1-8.
18. Kharb S, Sardana D, Nanda S. Correlation of thyroid functions with severity and outcome of pregnancy. Ann Med Health Sci Res. 2013;3(1):43-6.
19. Deshpande S, Yelikar K, Patil S, Andurkar S. Maternal thyroid hormone status in pre-eclampsia: a tertiary care hospital based study. IJRCOG. 2015;4(6):1853-7.
20. Wilson KL, Casey BM, McIntire DD, Halvorson LM, Cunningham FG. Subclinical thyroid disease and the incidence of hypertension in pregnancy. Obstet Gynecol. 2012;119(2 Pt 1):315-0.
21. Bankowska EM, Pawlowska A, Leibschang J. Thyroid function in pregnant women with pregnancy induced hypertension. Ginekol Pol. 2003;74(10):1044-8.
22. Danzi S, Klein I. Thyroid hormone and blood pressure regulation. Curr Hypertens Rep. 2003;5(6):513-0.
23. Sheffield JS, Cunningham FG. Thyrotoxicosis and heart failure that complicate pregnancy. Am J Obstet Gynecol. 2004;190(1):211-7.
24. Taddei S, Caraccio N, Virdis A, Dardano A, Versari D, Ghiadoni L, et al. Impaired endothelium-dependent vasodilatation in subclinical hypothyroidism: beneficial effect of levothyroxine therapy. J Clin End Metab. 2003;88(3):3731-7.
25. Alfadda A, Tamilia M. Preeclampsia-like syndrome that is associated with severe hypothyroidism in a 20-week pregnant woman. Am J Obstet Gynecol. 2004;191(5):1723-5.