



A Clinical Study on Pre-Eclampsia and Thyroid Hormone Alteration in Women Presenting to Tertiary Care Institute of North India

Authors

Dr Manisha Chauhan¹, Dr Saurabh Tomar²

^{1,2}Senior Resident, G.R. Medical College, Gwalior, M.P

Email: drsin100@gmail.com, 9165730003, manishaaa0@gmail.com, 9458559955

ABSTRACT

Background: *The obstetricians are increasingly becoming aware of the potential or adverse effects of hypothyroidism on the outcome of pregnancy. Preeclampsia and eclampsia are major causes of maternal and perinatal morbidity and mortality.*

Methods: *This analytical, cross sectional, case control study is designed to compare the levels of thyroid hormone in women with preeclampsia and in normal pregnant women in the third trimester.*

Results: *Levels of total T3 and T4 in preeclamptic women were significantly lower than that of controls whereas the mean level of TSH was significantly higher in preeclamptic group than controls.*

Conclusions: *Primary hypo-functioning of the thyroid can accompany mild preeclampsia. Estimation of thyroid hormone levels in first and the third trimester of pregnancy are recommended.*

Keywords: *Preeclampsia, Thyroid.*

INTRODUCTION

In the developing countries, Preeclampsia and eclampsia are major causes of maternal and perinatal morbidity and mortality. The physiological changes in the thyroid gland during pregnancy are well understood but only a few reports provide information about thyroid function in complicated pregnancies.^{2,4,5} The obstetricians are increasingly becoming aware of the potential or adverse effects of hypothyroidism on the outcome of pregnancy. The present study is designed to compare the levels of thyroid hormone in women with preeclampsia and in normal pregnant women in the third trimester.¹ Preeclampsia is defined by the National High Blood Pressure Education Program Working Group, as a blood pressure of 140/90

mmHg or more on two or more occasions, 6 hours apart, after 20 weeks of gestation and the presence of protein (which was diagnosed when a reading of 1+ or more, on the uristick, was found in repeated clean catch midstream urine sample) and/or edema. Although pregnancy is usually associated with very mild hyperthyroxinemia, preeclamptic women have high incidence of hypothyroidism which might co-relate with the severity of preeclampsia.² There are controversies about the mechanism and clinical significance of low concentrations of thyroid hormones in preeclampsia.³ High concentration of total and free thyroxine and subnormal total triiodothyronine and free triiodothyronine have been reported in some studies in preeclamptic patients, while in

some studies, low TT4 and FT4 and thyroxine binding globulin, high TSH and no change in total T3 was reported in proteinuric preeclamptic women.

METHODS

The study was approved by the ethical committee. Normal pregnant women of age group 20 to 36 years attending ANC clinic at S.N. Medical College Agra. comprised the reference group. This is analytical, cross sectional, case control study conducted at antenatal clinic of S.N. Medical College and Hospital Agra. Fifty pregnant women admitted with the diagnosis of preeclampsia in the third trimester were recruited for the study after obtaining informed consent. An equal number of age and gestation matched healthy normotensive pregnant women in the third trimester attending the antenatal clinic during the study period, constituted the control group. The development of hypertension any time during antenatal follow-up excluded them from the control group. 4 ml venous blood sample was taken from the cubital vein of (i) preeclamptic women, after the diagnosis was made but before the initiation of the antihypertensive treatment, and before the delivery and (ii) each control subject as mentioned above. Sera was separated and assessed immediately for total T3 (triiodothyronine), total T4 (thyroxine) and TSH (thyroid-timulating hormone) using ELISA. The data was tabulated and analyzed. All the quantitative parameters were expressed as mean with standard deviation (mean \pm SD) in both groups. Inclusion criteria High blood pressure equal or higher than 140/90 • mm/Hg in the sitting position and a proteinuria of equal or greater than 300 mg within 24 - hour urine collection or persistant (1+dipstick) in two random urine sample with an interval of 6 hour. Written consent for participating in the study. • Exclusion criteria Any history of thyroid disease such as hyper or • hypothyroidism or thyroid surgery. Consumption of thyroid related medications • Any known systemic disorder or ones which • diagnosed during study such as hypo

or hyperthyroidism. History of renal disease • History of hypertension •

Statistical analysis To test for the differences in the mean values between the two groups for various quantitative parameters, Student's unpaired t-test was applied when the data followed the normal approximation. Statistical significance was considered as P

RESULTS

In the case group, age ranged from 20 to 34 years and the range for the control group was from 20 to 36 years. The mean(\pm SD) age of the study group and control group was 27.8 \pm 5.24 years and 26.6 \pm 6.91 years respectively and there was no statistically significant difference between the two groups (P>0.05) (Table 1). In the preeclamptic women the gestational age was between 28 to 41 weeks compared with 28 to 40 weeks in control group. The mean of systolic blood pressure was 148 \pm 16.22 mmHg (140 to 220 mm Hg) and the mean for diastolic blood pressure was 92.4 \pm 6.16 mmHg (80 to 130 mmHg) in the preeclamptic women. In control group, mean systolic and diastolic blood pressure was 112 \pm 11.14 and 78 \pm 4.64 respectively.

Table1: Mean age and gestational age in normal pregnant and preeclamptic women.

	Normal pregnant women (Mean \pm SD)	Preeclamptic women (Mean \pm SD)
Age	26.6 \pm 6.91	27.8 \pm 5.24
Gestational age	35.5 \pm 4.2	34.6 \pm 3.8

N=50 in normal pregnant women; N=50 in preeclamptic women. Unpaired 't' test was applied; P value was >0.5 in both groups.

Levels of total T3 in preeclamptic women (151.34 \pm 8.68ng/dl) were significantly lower than that of controls (195.66 \pm 6.71ng/dl). Similarly a significant difference in the levels of Total T4 (11.33 \pm 1.02 μ gm/dl) versus (14.56 \pm 0.9 μ gm/dl), (p is less then 0.001) was observed in the preeclamptic group compared with the normotensive group. The mean level of TSH was significantly higher in preeclamptic group

(3.75±0.43) than controls (2.33±0.24) (Table2). The values of total T3, Total T4 and TSH in the two groups are shown in (Table 2). The mean values of thyroid hormones were within the normal laboratory reference ranges in both the groups.

Table 2: comparison of Total T3, Total T4 and TSH levels in normal pregnant and pre-eclamptic women.

	Normal mean ±SD N=50	Pre-eclamptic Mean±SD N=50	P value
Total T3 (ng/dl)	195.66±6.71	151.34±8.68	P <0.001
Total T4 (ugm/dl)	14.56±0.96	11.33±1.02	P < 0.001
TSH (uIU/ml)	2.33±0.24	3.75±0.43	P <0.001

N=50 in normal pregnant women; N=50 in preeclamptic women; Unpaired 't' test was applied, levels P <0.05 was considered statistically significant; T3 in ng/dl, T4 in ugm/dl and TSH in Uiu/ml.

DISCUSSION

In the present study, we observed T3 and T4 levels were significantly lower and TSH was significantly higher in preeclamptic patients. Similar findings were reported by Kaya E et al that serum T3, T4 and TBG values significantly lower and TSH was significantly higher in pregnancy and eclamptic women compared to value of control group.⁶ Other studies are also in agreement with our observation showing lower total T3 and T4 values and higher TSH value in pre-eclamptic women in third trimester.^{2,3,6,7} Modest decrease in thyroid hormones with concomitant increase in TSH level in maternal serum correlated with severity of pre-eclampsia and eclampsia and high levels of endothelin.³ Kumar Ashok et al, observed that more member of preeclamptic women had abnormally high TSH levels at the time of diagnosis when compared to normotensive women. A statistically significant higher number of cases with preeclampsia (76.7%) were also observed in pregnant woman with abnormally high TSH.⁸ It was suggested that, for reduced serum concentration of thyroid hormone in toxemia may in part be explained by the loss of Protein and hence protein bound

hormone.⁶ Since T3 is mostly peripheral conversion of T4, decrease in T3 associated T4 is a normal consequence besides involvement of liver and kidney in toxemia of pregnancy.⁴ Reduced serum concentration of TBG, T3 and T4 may also be explained by the faulty estrogen production due to placental dysfunction in pre-eclamptic women. It is well established that, there is a big increase in concentration of TBG during pregnancy due to influence of high levels of circulating estrogen and as approximately 97-99% of total thyroxine is protein bound, the interpretation of serum total thyroxine value is difficult.¹⁸ It is unlikely that pre-eclamptic patients had auto immune hypothyroidism because the abnormal T3 and T4 titres were not very high and all of them were normal when examined 6 weeks postpartum.

CONCLUSION

Identification of thyroid abnormalities and appropriate measures might affect the occurrence and severity of morbidity and mortality associating with preeclampsia. Present findings suggest that primary hypo-functioning of the thyroid can accompany mild preeclampsia and possibly contribute to the pathogenesis. Therefore in addition to recommended thyroid function screening in first trimester of pregnancy, its follow up within the third trimester of pregnancy is recommended.

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Conflict of Interest: None declared.

Ethical Approval: The study was approved by the Institutional Ethics Committee.

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