

Thyroid Stimulating Hormone (TSH) Level as a Possible Indicator of Pre-eclampsia

DHANANJAYA BS, SENDIL KUMARAN D, VENKATESH G, MURTHY NIRANJAN, SHASHIRAJ HK

ABSTRACT

Background: Pre-Eclampsia is characterized by hypertension and proteinuria. There is a high incidence of thyroid dysfunction during pregnancy resulting in adverse maternal and fetal effects. Therefore, we intended to evaluate the influence of pre-eclampsia on thyroid hormone levels.

Methods: Twenty five (25) pregnant women who developed pre-eclampsia and an equal number of age matched, parity matched and gestation age matched normal pregnant women were taken

for the study. Blood samples collected were estimated for T3, T4 and TSH which was measured using CLIA system Results: 64% offspring of the pre-eclampsia subjects had birth weight <2.5kg and the values were highly significant. T3 and T4 levels were within the normal limits and there was significant increase in TSH levels in pre eclampsia subjects.

Conclusion: In the present study the pre-eclampsia showed elevated TSH levels with a risk of low birth weight babies. Increase TSH levels could be used as a predictor of Pre-eclampsia.

Key Words: Pre-eclampsia, Thyroid profile, Thyroid Stimulating hormone (TSH)

INTRODUCTION

Pre-eclampsia is a leading cause of maternal and fetal/neonatal mortality and morbidity worldwide. Pre-eclampsia is a multi-system disorder of pregnancy, which is characterized by hypertension (Blood pressure > 140/90 mmHg) with proteinuria (urinary protein excretion of >300mg/l in 24hour specimen) after 20 weeks of gestation in previously normotensive non-proteinuric pregnant women [1],[2]. Between 5% and 15% of pregnant women experience thyroid abnormalities, a fact which justifies screening by means of clinical laboratory testing [3]. There is a high incidence of thyroid dysfunction during pregnancy resulting in adverse maternal (miscarriages, anaemia in pregnancy, pre-eclampsia, abruptio placenta and post-partum haemorrhage) and fetal effects (premature birth, low birth weight, increased neonatal respiratory distress) which may justify screening for thyroid function during pregnancy [4]. Mothers who had early-onset pre-eclampsia, were of significantly lower birth weight [5]. Maternal thyroid dysfunction during pregnancy has been shown to be associated with a number of adverse outcomes. For example, elevated maternal thyroid-stimulating hormone (TSH) has been associated with an increased risk of pre-term birth, placental abruption, fetal death, and impaired neurological development in the child [6],[7]. There are limited numbers of studies on the levels of thyroid hormones in pre-eclampsia and has been suggested that there may be an existence of mutual influences between pre-eclampsia and thyroid function [8].

Therefore, this study was undertaken to evaluate the influence of pre-eclampsia on thyroid profile. Also, this study intended to correlate the birth weight with thyroid profile parameters.

MATERIAL AND METHODS

The study was undertaken by the department of Obstetrics and Gynaecology (OBG), Sri Siddhartha Medical College, Tumkur, after the approval of the research and ethical committee. This study

included 50 subjects. Out of which twenty five (25) pregnant women who developed hypertension and proteinuria during their antenatal period were taken as pre-eclampsia cases. An equal number of age matched, parity matched and gestation age matched pregnant women without any previous disorders or pregnancy induced complications were selected as normal. Women with bad obstetric history, chronic illnesses and with known thyroid disorders were excluded from the study. Blood samples were obtained from both the groups at the time of their labor. Informed consent was obtained after explaining the nature and purpose of the study from all the subjects. Blood collected was estimated for thyroid profile namely T3, T4 and TSH. Thyroid profile was measured using CLIA (Chemiluminescence ImmunoAssay) system.

Statistical Analysis: Descriptive statistical analysis has been carried out in the present study using SPSS version 15.0 software. Results on continuous measurements are presented on Mean \pm SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. Student-t test (two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups (Inter group analysis) on metric parameters. Pearson's correlation was used to correlate the birth weight with thyroid profile parameters.

RESULTS

This case-control study for thyroid profile included 25 patients with pre-eclampsia and 25 normal pregnant women. The mean age was 24.32 \pm 2.76 years and 24.08 \pm 3.88 years for normal and pre-eclampsia subjects respectively. 76 % of the normal and 64 % of pre-eclampsia subjects were primigravida and 88% of the normal group and 60% pre-eclampsia patients were at term. The results obtained were tabulated. In this study we have observed that 16 (64%) offspring of the pre-eclampsia subjects had birth weight <2.5kg and the difference between the mean values of the

birth weight born to normal and pre-eclamptic subjects were highly significant [Table/Fig 1]. Thyroid profile values (T3 and T4) in normal and pre-eclampsia groups were within the normal limits.

Patients with pre-eclampsia showed significantly increased TSH levels ($p < 0.042$) compared to normal. [Table/Fig 2] shows the Pearson's correlation between birth weight and thyroid profile in pre-eclampsia subjects. It is shown that there is no significant correlation between the birth weight and thyroid profile parameters.

Variables	Controls	Pre-eclampsia	P-value
Birth weight (kg)	2.95 ± 0.38	2.25 ± 0.59	0.001**
T3 (nmol/L)	1.28 ± 0.35	1.15 ± 0.17	0.107
T4 (nmol/L)	9.93 ± 1.39	10.46 ± 1.63	0.224
TSH (uIU/ml)	2.44 ± 1.08	8.42 ± 14.31	0.042*

[Table/Fig-1]: Comparison of variables in controls and pre-eclampsia groups

**HS – Highly significant ($p < 0.001$)

*S – Significant ($p < 0.05$)

NS – Not significant ($p > 0.05$)

Relationship between	r-Values	p-Value	Significance
British weight vs. T3	0.16	0.45	NS
British weight vs. T4	0.06	0.77	NS
British weight vs TSH	-0.38	0.06	NS

[Table/Fig-2]: Pearson's Correlation between Birth Weight and Thyroid Profile in Pre- eclampsia Subjects

r = Pearson's correlation co-efficient.

**HS – Highly significant ($p < 0.001$)

*S – Significant ($p < 0.05$)

NS – Not significant ($p > 0.05$)

DISCUSSION

Though the effects of pre-eclampsia and thyroid dysfunction in pregnancy are very well studied, the relationship between the two is poorly established. Therefore this study was undertaken to know the influence of pre-eclampsia on thyroid profile parameters in euthyroid pregnant women. In this cross sectional study 64% of the pre-eclamptic women were primigravida, implying the role of parity as a risk factor for pre-eclampsia. Out of 25 pregnant women with pre-eclampsia tested for thyroid function, 60% were at term. The thyroid hormones levels were within the normal range and did not show any statistically difference between normal and women with pre-eclampsia. But TSH levels were higher in pre-eclampsia subjects which was significant. This result is similar to the situation seen in normal pregnancy where it is characterized by a progressive rise in serum TSH levels after 16 weeks of gestation [9].

Qublan et al in their study observed no significant differences in the levels of FT4, FT3 and TSH between normal and pre-eclampsia groups at various gestational ages [10]. They conclude that the thyroid function is not altered in severe pre-clampsia, therefore it does not reflect the severity of pre-eclampsia. Still, the dynamic state of thyroid gland due to the pre-eclamptic condition cannot be ruled out and a study on larger sample size is warranted. Babies of the pre-eclamptic women had lesser birth weight. Kumar et al [11] observed the similar findings in pre-eclamptic and eclamptic women with high TSH levels and low thyroid hormones. In pregnant women with hyperthyroidism and pre-eclampsia it was established that they had the risk for low birth weight infants [8]. In conclusion, these findings suggest pre-eclampsia has the effect on the TSH levels exposing the pre-eclamptic patients to the risk for low birth weight babies. In the present study TSH levels were elevated in pre-eclamptic patients compared to normal pregnant women, which could indicate the possible etiology for pre-eclampsia. Elevated TSH levels could be used as predictor of pre-eclampsia. However, more detailed study with larger sample size needs to be carried out.

REFERENCES

- [1] Cunnigham FG, Leveno KL, Bloom SL, Hauth JC, Gilstrap LC and Wenstrom KD, et al. Hypertensive disorders in pregnancy. In: Cunnigham FG, Leveno KL, Bloom SL, editors. Williams Obstetrics. 22nd ed. New York; McGraw-Hill; 2005: chap 34, 1237.
- [2] Sibai B, Dekker G, Kupferminc M. Pre-eclampsia. *Lancet*. 2005; 365:785–99.
- [3] Glinoe D The Regulation of Thyroid Function in Pregnancy: Pathways of Endocrine adaptation from Physiology to Pathology. *Endocrine Reviews* 1997; 18:404-33.
- [4] Lazarus JH. Screening for thyroid dysfunction in pregnancy: is it worthwhile? *J Thyroid Res*. 2011; 2011:397012. Epub 2011 Jun 8.
- [5] Obed SA and Patience A. Birth Weight and Ponderal Index in Pre-Eclampsia: A Comparative Study. *Ghana Med J*. 2006 March; 40(1): 8–13.
- [6] Casey BM, Dashe JS, Wells CE, McIntire DD, Byrd W, Leveno KJ et al. Subclinical hypothyroidism and pregnancy outcomes. *Obstetrics and Gynecology* 2005; 105: 239–45.
- [7] Allan WC, Haddow JE, Palomaki GE, Williams JR, Mitchell ML, Hermos RJ, et al. Maternal thyroid deficiency and pregnancy complications: implications for population screening. *Journal of Medical Screening* 2000; 7:127–30.
- [8] Vojvodic LJ, Sulovic V, Pervulov M, Milacic D, Terzic M. The effect of pre-eclampsia on thyroid gland function. *Srp Arh Celok Lek* 1993; 121(1-2):4-7.
- [9] Kurioka H, Takahashi K, Miyazaki K. Maternal thyroid function during pregnancy and puerperal period. *Endocr J*. 2005 Oct; 52(5):587-91
- [10] Qublan HS, Al-Kaisi IJ, Hindawi IM, Hiasat MS, Awamleh I, Hamaideh AH et al. Severe pre- eclampsia and maternal thyroid function. *J Obstet Gynaecol*. 2003 May; 23(3):244-46.
- [11] Kumar Ashok, Ghosh BK, Murthy NS. Maternal thyroid hormonal status in pre-eclampsia. *Indian Journal of Medical Sciences*, February 2005; 59(2):57-63.

AUTHOR(S):

1. Dr. Dhananjaya B.S.
2. Dr. Sendil Kumaran D.
3. Venkatesh G.
4. Murthy Nirranjan
5. Shashiraj H.K.

NAME OF DEPARTMENT(S)/INSTITUTION(S) TO WHICH THE WORK IS ATTRIBUTED:

Sri Siddhartha Medical College, Tumkur – 572102, Karnataka, India.

NAME, ADDRESS, TELEPHONE, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. G. Venkatesh
Associate Professor, Dept. of Physiology,
Sri Siddhartha Medical College,
Tumkur, Karnataka, India – 572102.
Phone: 09886215235
E-mail: g.venkatesh2@gmail.com

DECLARATION ON COMPETING INTERESTS:

No competing Interests.

Date of Submission: **Sept 01, 2011**

Date of peer review: **Sept 20, 2011**

Date of acceptance: **Oct 25, 2011**

Date of Publishing: **Dec 25, 2011**