

Research Article

Thyroid Hormones Pattern in Preeclampsia

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Abstract

Objectives: To assess thyroid hormones pattern in preeclampsia in third trimester, in our Pakistani population(Punjab).

Methods: It was a comparative cross-sectional study. Thyroid hormones; namely thyrotropin (TSH), Total triiodothyronine (tT3), free triiodothyronine (fT3), Total thyroxine (tT4) and free thyroxine (fT4) were evaluated by enzyme linked immunoassay (ELISA) in 17 diagnosed preeclamptic subjects with 16 number of matched normotensive pregnant subjects. Data was entered in the form of a questionnaire and analyzed by using version SPSS 17.

Results: In this study the mean TSH concentration was 100% higher in preeclamptic subjects as compared to normotensive pregnant subjects, whereas Mean of tT3, tT4, fT3 and fT4 were lower when compared between healthy normotensive pregnant and preeclamptic women but no significant difference was seen between both the groups.

Conclusion: This study shows statistically non-significant increase in TSH levels and decrease in total and free T3 and T4 levels of pre-eclampsia as compared to the normotensive pregnant subjects.

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Introduction

Modifications in thyroid hormones during gestation are well-documented; however, information regarding adaptation of thyroid function in pre-eclampsia (PE) is scanty. Pre-eclampsia, also called toxemia of gestation, was established according to American college of obstetrics and gynecology (ACOG), After the 20th weeks of pregnancy a blood pressure of more than 140/90 mm Hg and proteinuria higher than 300mg/24hr were detected on at least two occasions more than 6hrs apart.¹ PE is a multisystem disorder of the pregnancy

that affects the fetus because of placental dysfunction.² These fetuses are at the threat of premature delivery and intra-uterine growth retardation.³

PE women have high occurrence of hypothyroidism that might correlate with the severity of PE. Although pregnancy is related with mild hyperthyroxinemia.^{4,5,6} Additionally hypothyroidism is one of the documented causes of hypertension i.e. the physiological variations in thyroid gland during gestation have been suggested as one of the pathophysiologic cause of PE.⁷ The high circulating estrogen levels during the gestation are accounted for fluctuations in

thyroid function.⁸

Women with PE more often had elevated TSH levels at the end of pregnancy and women with history of one or more episodes of PE have a higher risk of developing subsequently reduced thyroid function.⁹ Maternal thyroid dysfunction during gestation has been shown to be associated with a number of adverse outcomes. For example, elevated maternal TSH has been associated with an increased risk of placental abruption, premature birth, still birth, and mental retardation in the child.¹⁰ These complications may justify screening for thyroid function during gestation.¹¹

Thyroid adaptations in pregnancy in first and second trimesters have received greater attention compared to third trimester. Furthermore hypertension is prominent in later pregnancy. Thus thyroid hormones adaptation in third trimester specifically accompanying PE has yet to be worked out in Pakistani population.

The current study is being carried out to assess thyroid hormones pattern and adaptations in PE in Pakistani population. It will enable to understand and address thyroid behavior in PE for better management.

Methods

This comparative cross sectional study was conducted in Institute of Molecular Biology and Biotechnology, The University of Lahore, in collaboration with the Jinnah Hospital affiliated to Allama Iqbal Medical College, Lahore.. A total of 33 pregnant subjects volunteered to participate in the study. They belong to the area of Punjab around Lahore. Out of these 17 fulfilled the inclusion criteria of PE and 16 were normotensive.

In this study, 17 clinically diagnosed preeclamptic women during third trimester (28-40 weeks) having age 18-40 years with no history of thyroid disease before and through pregnancy were compared with 16 healthy normotensive pregnant women as shown in table 1. Patients with known history of chronic hypertension, renal disorders, cardiovascular diseases, diabetes, any metabolic disorder that may threaten to mother or fetus and history of any treatment that might disturb the thyroid function were excluded from the study.

In this research, patients were included from OPD and hospital admission those fulfilling the inclusion criteria after taking a written informed consent that was approved by the Human Research Ethics Committee of The University of Lahore. Detailed history and examination was done. Data was documented in the form of a questionnaire.

The 5ml sample of venous blood was collected by venipuncture method under aseptic measure in disposable syringe and immediately transferred to plane serum vials and kept for 30 min to clot. It was centrifuged at 3000 rpm for 10 min. The processed samples were labeled and stored in a freezer at -20°C until used for hormone assays. Laboratory work was performed at The School of Biological Sciences, University of the Punjab; and Pathology Laboratory of Jinnah Hospital Lahore. Serum TSH, tT3, tT4, fT3 and fT4 levels were estimated by ELISA using kits titled as Accu Bind ELISA Micro wells. MONO-BIND Inc. Lake Forest, CA, 92630.

Data was entered and analyzed by using SPSS version 17 (SPSS, Inc, Chicago, IL, USA). Data for serum thyroid hormones was described by using Mean±SEM (standard error of mean). The significance of difference between the groups was analyzed by independent t-test. P value < 0.05 was considered statistically significant.

Results

This study shows the comparison of thyroid hormones between healthy normotensive pregnant and preeclamptic women. The average concentration of TSH in normotensive pregnant group was $3.28 \pm 0.29 \mu\text{IU/ml}$. The mean value of TSH in preeclamptic group was found $6.56 \pm 1.88 \mu\text{IU/ml}$ that was observed 100% higher in PE but all the increases were statistically not significant. The levels of tT3, tT4, fT3 and fT4 found to be lower in Preeclamptic group when compared with normotensive pregnant group and the difference was found to be non-significant between both the groups as shown in table: 2.

Discussion

PE is a serious complication of gestation with unknown etiology. It complicating up to 15% of pregnancies and accounting for about a quarter of all antenatal admissions in the UK. There is no such data for our populations thus it is imperative to investigate various aspects of PE on thyroid function. The effects

Table 1: Total Number of Volunteers Participated, their Age, Parity and Blood Pressure Distribution

	Normotensive pregnant Group	Preeclamptic Group
No. of subjects	16	17
Age Mean±SEM	25.12±0.86	26.06±1.04
Parity		
Nulliparous	7	5
Multiparous	9	12
Systolic BP mm/Hg Mean±SEM	120	157.64±3.97
Diastolic BP mm/Hg Mean±SEM	80	107.05±3.06

Table 2: TSH, tT3, tT4, fT3 and fT4 in Normotensive Pregnant Group and Preeclamptic Group (Mean±SEM)

Parameters Mean±SEM	Normotensive Pregnant group	Preeclamptic Group	P-value	% Difference in groups
TSH	3.28±0.29	6.56±1.88	0.672	100% Higher
tT3	1.22±0.03	1.19±0.04	0.93	2.4% Lower
tT4	13.96±1.35	11.09±1.39	0.58	20% Lower
fT3	2.94±0.19	2.67±0.12	0.65	9.00% Lower
fT4	2.91±0.35	2.81±0.46	0.99	3.4% Lower

of PE and thyroid hormones in pregnancy are very well studied. The thyroid hormones levels were deranged but did not show any statistical difference between normotensive pregnant and preeclamptic subjects. Hence, the relationship between the two is poorly established.

PE is defined as triad of hypertension, edema and proteinuria; it can affect other maternal systems.¹² In recent years, the relationship between thyroid hormones and hypertensive pregnancies has been a matter of concern. However, there is still controversy surrounding this topic. Despite decade of rigorous research, how pregnancy incites or aggravates hypertension remains unsolved.¹³ In PE, there is failure of estrogen production due to placental dysfunction resulting in lowering of TBG, tT3, tT4 along with growth retardation of the fetus.⁵ This causes decreased conversion of T4 to T3 in the liver.¹⁴ Hypothyroidism can cause contraction of vascular smooth muscles both in renal and systemic vessels which results in raised diastolic hypertension, peripheral vascular resistance, and reduce tissue perfusion.^{15,16}

Related results with elevated TSH level and decline in thyroid hormones concentrations were observed in

PE by Kumar et al. Their outcome suggested that preeclamptic women had higher prevalence of hypothyroidism than normotensive pregnant women.^{5,17} Manifestation of PE might be linked with elevated TSH levels. Kharb, et al indicate the role of TH in pregnancy might be of help in predicting the occurrence of PE.¹⁸ Khademiet al compared the serum level of T3, T4 and TSH in PE and normal pregnancy in Iranian women and found no possible relation between them.¹⁹ Dhananjaya et al assess that elevated TSH levels could be used as a prognosticator of PE.²⁰ Larijaniet al found rise in TSH level, but significant decrease in fT3 and fT4 levels when compared with normal controls. So, this suggest that hypofunctioning of the thyroid can accompany PE and cause the under lying pathology.¹⁴ In the present study PE subjects had shown alterations in thyroid functions as compared to normotensive pregnant. Especially the increase in TSH levels were marked however were not shown to be significant statistically. Despite highly increased values non significance of comparison statically is considered to be low number of replicates. So our study supports the previous studies but it requires further investigation and understanding on large scale. It recommended that addressing changes in thyroid hormone status in pregnancy might be of help in preventing the occurrence and complications of PE.

Conclusion

This study shows statistically non-significant increase in TSH levels and decrease in, tT3, tT4, fT3 and fT4 levels of PE as compared to the normotensive pregnant subjects. These changes require reassessment and that is possible with larger sample population. Women who develop PE are more likely to have hypothyroidism. So, raised TSH levels could be used as predictor of PE.

Ethical Approval: Given

Conflict of Interest: None

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