Research Article

Maternal thyroid profile in pre-eclampsia

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Abstract

Background: During normal pregnancy, changes in thyroid function are well-documented, i.e., hypothyroidism is a common finding seen in pregnancy leading to various adverse maternal and fetal effects, but there is no adequate information about thyroid function in pre-eclampsia.

Objective: To study maternal thyroid profile in normal pregnancy and pre-eclampsia.

Materials and Methods: Blood sample of 30 normal pregnant woman and 30 pre-eclampsia was collected and thyroid hormone assay was done by radioimmunoassay (RIA). Descriptive statistics such as mean and SD were used. Comparison between pre-eclampsia group with normal group was done by unpaired t-test. A *p*-value less than 0.05 was considered as significant.

Results: Thyroxine (T_4) and tri-iodothyronine (T_3) levels showed no difference between the normal pregnancy (9.03 ± 1.18, 1.21 ± 0.3) and pre-eclampsia patients (10.16 ± 1.13, 1.25 ± 0.11), but the thyroid-stimulating hormone (TSH) levels in pre-eclampsia patients were increased (7.22 ± 1.3) when compared to normal pregnancy ($p = 0.0001$).

Conclusion: There was no significant difference in the thyroxine (T_4) and tri-iodothyronine (T_3) levels in two groups, but there was a significant increase in thyroid stimulating-hormone (TSH) levels in pre-eclampsia patients (7.22 ± 1.3) compared to normal pregnancy (2.48 ± 1.05) ($p = 0.0001$).

KEY WORDS: pre-eclampsia, normal pregnancy, maternal thyroid profile, TSH

Introduction

As pregnancy is a physiological process, various physiological adjustments occur in different organ systems to provide nutrition to the fetus and the metabolic adjustments occur in circulatory, hormonal, and respiratory functions.[1]

Hypothyroidism is the most common disorder of thyroid function in pregnancy, which has been associated with fetal loss, pregnancy-induced hypertension, preterm delivery, placental abruption, and reduced intellectual function in the offspring.[2,3] Changes in thyroid function tests occur during pregnancy as a result of physiological alterations. Pre-eclampsia is a leading cause of maternal and fetal morbidity and mortality worldwide. Pre-eclampsia is a multisystem disorder of pregnancy, which is characterized by hypertension (blood pressure > 140/90mmHg) with proteinuria (urinary protein excretion of > 300mg/l in 24 h specimen) after 20 weeks of gestation.[4] During normal pregnancy, changes in thyroid function are well-documented,[5] but there is no adequate information about thyroid function in pre-eclampsia. During pregnancy, there is an increased thyroid demand and increased iodine uptake and synthesis of thyroid hormones. Even though there is a state of hypothyroxinemia in normal pregnancy, it is more pronounced in pre-eclampsia. Moreover, hypothyroidism has been listed as one of the causes of high-blood pressure, i.e., the physiological changes in thyroid gland during pregnancy have been suggested as one of the pathophysiologic causes of pre-eclampsia. A study done to see the influence of pre-eclampsia on thyroid parameters has suggested that pre-eclampsia has the effect on TSH levels exposing pre-eclamptic patients to the risk for low birth weight babies.[6]

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Table 1: Thyroid hormone levels (T_4), (T_3), and (TSH) in normal pregnancy

Thyroid hormone level	Pre-eclampsia	Normal	Mean difference	95% CI	*t*-value	*p*-value
Thyroxine (T_4) (nmo/L)	10.16 ± 1.13	9.03 ± 1.18	0.53	–0.06 to 1.13	1.77	0.08
Tri-iodothyronine (T_3) (nmo/L)	1.25 ± 0.11	1.21 ± 0.3	0.04	–0.07 to 0.15	0.68	0.49
Thyroid-stimulating hormone (TSH) (ulU/ml)	7.22 ± 1.3	2.48 ± 1.05	4.74	4.13 to 5.35	15.5	0.0001

As there are few studies done to see the thyroid hormone levels, this study was undertaken to do the thyroid profile and correlate with pre-eclampsia.

Materials and Methods

This study was undertaken after the approval from the human ethical clearance from the human ethical clearance committee of Navodaya Medical College and Research Centre, Raichur. The study included 30 subjects diagnosed of pre-eclampsia, and 30 age-matched normotensive pregnant women.

After taking the written consent from the subjects, blood sample was collected, and the thyroid hormone assay was done.

Descriptive statistics such as mean and SD were used. Comparison between pre-eclampsia group and normal group was done by unpaired *t*-test. A *p*-value less than 0.05 was considered as significant.

Results

There was no significant difference in the thyroxine (T_4) in normal pregnancy (9.03 ± 1.18nmo/L) and in pre-eclampsia (10.16 ± 1.13nmo/L) and tri-iodothyronine (T_3) levels in normal pregnancy (1.21 ± 0.3) and in pre-eclampsia (1.25 ± 0.11), thyroid-stimulating hormone (TSH) levels in pre-eclampsia patients were increased ($p = 0.0001$).

Discussion

In this study, we have analyzed the thyroid hormone levels in normal pregnancy and pre-eclampsia. It was found that there was no difference in the serum T_3 and T_4 levels in normal pregnancy and in pre-eclampsia. But TSH levels in pre-eclampsia was significantly increased ($p = 0.0001$)

The results of our study support various studies done previously, which have shown biochemical hypothyroidism in pre-eclampsia.[7,8] Qublan et al. reported no significant difference in TSH level between normal pregnancy and pre-eclampsia.[9] Kharb et al. reported higher TSH levels in severe pre-eclampsia then in the mild ones ($p = 0.001$) and also showed that pre-eclampsia patients with high TSH levels had significantly higher mean arterial pressure (MAP).[5] Tolino et al. have shown in their study that thyroid hormone levels might be correlated with occurrence and severity of morbidity and mortality of pre-eclampsia, and TSH levels of 5μ IU/ml carry a higher risk of development of pre-eclampsia.[8]

Hypothyroidism can cause vascular smooth muscle contraction both in systemic and renal vessels, which leads to increased diastolic hypertension, peripheral vascular resistance, and decreased tissue perfusion.[10,11] Thyroid dysfunction can be associated with proteinuria, which[12] results in increased excretion of thyroxine and thyroid-binding globulins.

Changes in thyroid function tests occur during pregnancy as a result of physiological alterations in several factors controlling thyroid homeostasis at this time. Thyroxine-binding globulin concentrations increase primarily because of decreased clearance resulting from increasing estrogen concentrations and an increase in urinary iodine excretion, particularly in the first trimester. Human chorionic gonadotropin, a weak TSH agonist, is raised at this time, and results in increased release of T_4 and T_3, which leads to low measurable TSH concentrations.[1]

Conclusion

The study shows significant increase in the TSH levels in pre-eclampsia compared normal pregnancy. The thyroid disorder is one of the predisposing causes for pre-eclampsia. Hence, thyroid hormonal assay can be considered as a screening test for early diagnosis and treatment of pre-eclampsia to prevent further complications of it.

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