Original Article

Co-relation of Serum Thyroid Hormones level among Pre-Eclamptic and Normotensive Pregnant Women at LUMHS Hospital Hyderabad/Jamshoro

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Abstract

Objective: In this study serum thyroid hormones level in pre-eclamptic was compared with serum thyroid hormones level of normotensive pregnant women.

Methodology: This comparative study was conducted in Departments of Physiology and Gynecology and Obstetrics with collaboration of Diagnostic Laboratory of LUMHS Hyderabad/Jamshoro. Total 140 subjects were included, out of which 70 were normotensive and 70 were pre-eclamptic pregnant women with no known medical or obstetric disease. 5ml venous blood sample of patients were collected aseptically by venipuncture for analyzing Serum T3, T4, TSH levels. Data was collected via study proforma, and informed consent was taken.

Results: Mean age of normotensive women was 28.30 years and 28.87 years of pre-eclamptic women. Average gestation age of normotensive was 32.01 weeks and 31.89 weeks in pre-eclamptic (p-0.799). Average BMI was 26.23kg/m2 in normotensive and 25.94kg/m2 in pre-eclamptic (p-0.724). The average TSH was 2.17+1.81 in normotensive and 3.76+1.93 in pre-eclamptic (p-0.0538), and average of T3 was 2.36ng/ml in normotensive and 1.28ng/ml in pre-eclamptic (p-0.025) and T4 statistically insignificant according to both groups (p->0.05) of pregnant women.

Conclusion: Serum TSH level found to be increased while serum T3, T4 level were significantly decreased in pre-eclamptic in contrast to normotensive cases. This study may help to predict, diagnose and manage pre-eclampsia and decrease the fetal and maternal complications..

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Introduction

Pregnancy is the physiological phenomenon that ensures the growing fetus receives appropriate nutrients. During pregnancy, numerous physiological variations take place in the mother's various organ systems, including circulatory, hormonal, and metabolic changes.[1] Gestational Hypertensive Disorders are responsible for a significant number of prenatal problems, as well as prenatal and maternal near-misses or fatality. GHDs are thought to affect 5.2–8.2 percent of all pregnancies. Non-proteinuric GH affects 1.8–4.4 percent of pregnancies, while PE affects 0.2–9.2 percent.[2] PE is a multi-system pregnancy-associated condition commonly known as pregnancy toxemia. PE was characterized using ACOG criteria: a clinical condition characterized by fresh onset of high blood pressure (SBP >140 mm of Hg or DBP >90 mm of Hg) and increased protein levels (>0.3g or 300mg protein in a 24 hour urine sample or 1+ on dipstick) following 20 weeks of pregnancy in earlier non proteinuric and normotensive patients, as well as a variety of other clinical manifestations including pitting edoema, headache, visual disturbances. [3] The specific aetiology of PE is unknown; however, it is thought to arise when abnormalities in the remodeling of maternal helix arteries occur. Decreased blood supply towards the placenta leads to placental hypoxia that causes the release of substances that might induce organ failure somewhere else within the body.[4-5]

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T3 and T4 are thyroid hormones produced by thyroid gland. T4 is converted into T3, which is an active hormone. TSH, which is produced by pituitary glands, regulates thyroid hormone synthesis.[6-7] Thyroid hormone supply is critical for a smooth pregnancy as well as good foetal development and growth. Milder types of thyroid disease are now being linked to these negative pregnancy outcomes in a growing number of research.[8] The intensity of PE is linked to maternal hypothyroidism and a concurrent rise in TSH titers.[9] As the degree of PE grows, so does the amount of TSH, which is accompanied by a drop in T3, T4.[10] Maternal deficiency or excess for thyroid hormones concentrations can affect maternal and foetal outcomes at any point in the pregnancy. In a healthy pregnancy, variations in thyroid functioning are well established, but evidence on thyroid activity in pre-eclamptic gestation is limited. The purpose of our research study is to assess the serum thyroid hormone level among preeclamptic patients, as well as to compare these parameters among normotensive and preeclamptic females to see if there is a discrepancy and to utilize the findings in predicting and reducing the negative impacts of PE by timely diagnosis and management.

Methodology

This cross-sectional comparative study was conducted by using non probability convenience sampling technique. Study was carried out at Physiology Departments LUMHS. Blood samples were collected from department of Gynecology and Obstetrics at Liaquat University Hospital Hyderabad/Jamshoro and laboratory work was carried out at Diagnostic and Research Laboratory of LUMHS Hyderabad/Jamshoro. Study duration was June 2021 to January 2022.

Sample size was calculated by Rao software taking prevalence of pre-eclampsia 10%. Obtained sample size was n=139. 70 were normotensive (control) and 70 were pre-eclamptic (case). All the pregnant women aged 18-40 years, having 20-36 weeks of gestational age [assessed by taking the history of last menstrual period (LMP)], either primipara or multiparous were included. Pregnant women age <18 or >40 years or below 20 weeks gestation or with any kind of medical or obstetric disorders or with history of medicine or addiction. All pregnant women filling the inclusion criteria were registered and entertained in the study. Informed consent was taken in clearly understandable national or regional (if required) languages. The participants were selected from department of Gynecology and Obstetrics of Liaquat University Hospital, Jamshoro/Hyderabad, Data Analysis and Laboratory work were done in department of Physiology and Diagnostic Research Laboratory LUMHS, Jamshoro respectively. Participants were divided into two groups one group include normotensive (control) and other include pre-eclamptic (case). 5ml venous blood sample of patients were collected aseptically by venipuncture for analyzing Serum T3, T4, TSH by enzyme immunoassay on ELISA Reader using Cobas e 411 Thyroid kits by Hitachi. The data was analyzed by using statistical SPSS software package (version 26.0).

Results

A total of 140 cases were studied comparatively, particularly as 70 normotensive cases and 70 pre-eclamptic cases. Mean age of normotensive cases was 28.30 years and of pre-eclamptic cases was 28.87 years (p-0.498). Average gestation age of normotensive cases was 32.01 weeks and of pre-eclamptic cases was 31.89 weeks (p-0.799). average BMI was also statistically insignificant among both groups as; 26.23kg/m^2 in normotensive cases and 25.94kg/m^2 was in pre-eclamptic cases (p-0.724). Table I

Table I: Descriptive statistics of age, gestational age and BMI, Blood Pressure And Thyroid Profile of both study groups (n=140)

Variable	Study groups	Mean	Std. D	p-value
Age (years)	Normotensive	28.30	4.96	
	Pre-eclamptic	28.87	4.97	0.498
Gestational age (weeks)	Normotensive	32.01	3.04	
	Pre-eclamptic	31.89	2.92	0.799
Body mass index (BMI kg/m^2)	Normotensive	26.23	5.02	
	Pre-eclamptic	25.94	4.51	0.724
T3 (ng/ml)	Normotensive	2.36	0.375	
	Pre-eclamptic	1.28	0.470	0.085
T4 (mcg/dl)	Normotensive	11.51	2.076	
	Pre-eclamptic	10.33	2.248	0.623
TSH (IU/ml)	Normotensive	2.17	1.819	
	Pre-eclamptic	3.76	0.934	0.538

Table II: Descriptive statistics of parity of both study groups (n=140)					
Variable		**Study groups**		**Total**	**p-value**
		Normotensive	**Pre-eclamptic**		
Parity	**MULTI**	51	49	100	0.154
		71.1%	70%	71.4%	
	PRIMI	19	21	40	
		28.9%	30%	28.57%	
Total		70	70	140	
		100.0%	100.0%	100.0%	

Multiparous women were most common in both groups as; 71.4% and 28.57% were primiparous and the findings were statistically insignificant (p-0.154). Table II

The average of TSH was 2.17±1.81 in normotensive cases and 3.76+0.93 was in pre-eclamptic cases (p-0.053). and average of T3 was 2.36+0.3 in normotensive and 1.28±0.4 in pre-eclamptic (p-0.025) cases while T4 was statistically insignificant according to both groups (p->0.05) as shown in Table I

There was a positive correlation between Systolic blood pressure and TSH in both pre-eclamptic and normotensive cases Figure.1 and 4.

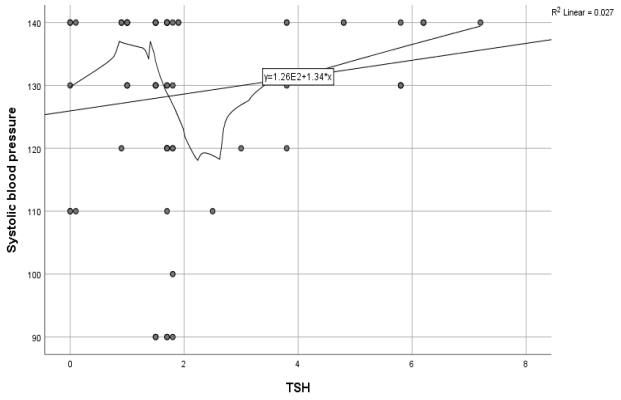

Figure 1. Correlation between Systolic blood pressure and TSH in normotensive cases

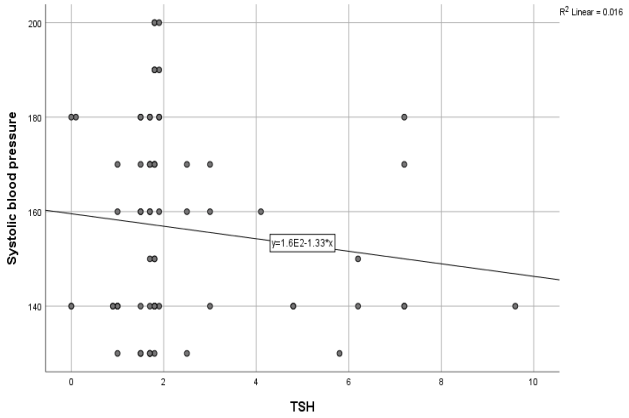

Figure 2. correlation between Systolic blood pressure and TSH in Pre-eclamptic cases

Discussion

Pre-eclampsia is a disease of theories" where the exact etiology is still unknown. In this study a total of 140 cases were studied comparatively, particularly as 70 normotensive cases and 70 pre-eclamptic cases and mean age of normotensive cases was 28.30 years and of pre-eclamptic cases was 28.87 years (p-0.498), average gestation age of normotensive cases was 32.01 weeks and of pre-eclamptic cases was 31.89 weeks (p-0.799) and average BMI was also statistically insignificant among both groups as; 26.23kg/m^2 in normotensive cases and 25.94kg/m^2 was in pre-eclamptic cases (p-0.724). Consistently Al Ghazali B et al[11] reported that the average age of normotensive females was 27.28±6.14 years and 24.64±5.968 years was of severe pre-eclamptic women, average gestational age of normotensive women was 37.93±1.18 weeks and 33.42±3.01 weeks was of pre-eclamptic women. In another study of Nieves Martell-Claros et al[12] demonstrated that the mean age of the pre-eclamptic women was 32.1±6.24 years with range of 14-47 years, out of all 31.6% were nulliparous and remaining were multiparous. In the study by Begum T et al[123] reported that mean age of the cases was 21.02±2.05 years, In this study both multiparous and primiparous women were included in both groups as; 71.4% were multiparous and 28.5% were primiparous and the findings were statistically insignificant (p-0.154). On other hand in the study of Ghazali B et al[12] reported that average parity was 1.43±1.28 in control women and 1.24±1.44 was in pre-eclamptic women. Begum T et al[13] also reported that the multiparous women were in majority.

In this study findings regarding average blood pressure were statically significant (p-0.001). the average systolic blood pressure was 156.43±20.36 and average diastolic blood pressure was 103.57±10.05 in pre-eclamptic women. These findings were almost similar to the findings of other studies.[14-16] In this study the average of TSH was 2.17±1.81 in normotensive cases and 3.76±0.934 was in pre-eclamptic cases (p-0.053). and average of T3 was also statically significant (p-0.025) but

T4 were statistically insignificant according to both groups (p->0.05). Consistently Elhaj ET et al[18] reported that the average of TSH was 2.3 (1.9–2.6) in normotensive women and 1.5 (1.0–1.9) was among pre-eclamptic women., average T3 was 0.7 (0.5–1.3) in healthy pregnant women and 2.1 (1.9–2.6) in pre-eclamptic women, while mean T4 was 0.8 (0.7–1.1) in healthy women and 0.9 (0.7–1.1) was in pre-eclamptic women, while their findings were statistically significant.

On other hand in the study of Nour El-dien M et al[19] demonstrated that in the study group, the average level of Free Triiodothyronine (fT3) was 4.07 0.78 pg./ml, whereas in the control group, it was 3.53 0.50 pg./ml. An average level of thyroxine (T4) in the blood of people in the study group was 0.99 ng/dl, whereas the level of thyroxine in the blood of people in the control group was 1.12 ng/dl. The (TSH) average in the study group was significantly higher than the TSH average in the control group, which was 1.96 1.23 IU/ml on average. The difference between the two groups was statistically significant. Although in the sutyd of Sardana D et al[17] reported that when compared with preeclamptic women, the T4 concentrations in normotensive cases were found to be considerably greater (p<0.01). Further they reported that in their study, preeclamptic women with lower birth weight babies showed a higher level of hypothyroxinemia and higher levels of TSH. This can be attributed to the dysfunction of the placenta in preeclamptic patients. This dysfunction can lead to a decrease in the production of estrogen, which then results in lower levels of TBG, TT3, and TT4, and can lead to fetal growth failure.[17] The findings were statistically significant as per both normotensive and hypertensive groups (p-0.025).

Conclusion

As per study conclusion on the comparison serum thyroid hormones levels were observed to be statically difference among pre-eclamptic with normotensive pregnant women, serum TSH level positively correlate with SPB in pre-eclamptic while serum T3, T4 level were significantly negatively correlated with BP among pre-eclamptic females in contrast to normotensive cases.

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