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Study on Prevalence of Hypothyroidism in Women With Preeclampsia

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ABSTRACT

The prevalence of hypothyroidism in pre eclamptic women is studied to analyse the correlation between hypothyroidism and severity of pre eclampsia. A cross sectional study was conducted involving 200 pre eclamptic and 200 normotensive patients over a period of one year. Thyroid function test was done in both the groups and Chi square test was used to analyse variables and p <0.05 was considered statistically significant. The prevalence of SCH in controls is 13.11% and 43% in preeclamptics and the prevalence of OH in controls Vs preeclamptics is 0.55% Vs 2.5%. Hypothyroidism is more common and the TSH levels are significantly higher in the severe PE as compared with mild PE. Since SCH and OH is associated with lots of maternal and perinatal adverse effects, there is a need for early diagnosis of these disorders and hence a routine screening of antenatal women for thyroid function should be made mandatory

KEYWORDS pre eclampsia, hypothyroidism, normotensive

INTRODUCTION:

A variety of endocrine disorders complicate pregnancy, thyroid dysfunction is one of the common conditions among them. Thyroid gland function is intimately related to reproductive performance in women. Pregnancy is associated with major changes in hypothalamic pituitary thyroid axis, iodine metabolism and the immune function. To meet the increased metabolic demands in pregnancy changes in thyroid physiology occur which is reflected by altered thyroid function tests. So thyroid disorders commonly occur in pregnancy. Though gestational hyperthyroidism is uncommon (0.2%),hypothyroidism occurs in 2.5% of pregnancies and overt hypothyroidism complicates from 2 to 3 pregnancies per 1000(Casey and colleagues,2005). Subclinical hypothyroidism is much more prevalent.

Although pregnancy is associated with mild hyperthyroxinemia, preeclamptic women have a high incidence of hypothyroidism that might correlate with the severity of preeclampsia. On the other side preeclampsia occurs in 16.7% of subclinical cases and 43.7% of overt hypothyroidism. The changes in thyroid gland in pregnancy is accounted by high circulating estrogen.

There are controversies in the mechanism of hypothyroidism in preeclampsia which are accounted by decreased plasma protein concentration and high levels of endothelin and soluble fms like tyrosine kinase

Thus by analyzing the prevalence of hypothyroidism in pre eclampsia and studying the
association factors we can make screening universal instead of target screening in
antenatal patients and we can start early thyroxine supplementation in affected individuals.

AIM:

- To study the prevalence of hypothyroidism in women with preeclampsia and to compare them with age matched controls.
- To look for the correlation between hypothyroidism and severity of pre eclampsia.
- To analyse the association between onset of preeclampsia and Hypothyroidism.

MATERIALS AND METHODS:

This study was conducted in Govt. R.S.R.M. Lyingin hospital, Royapuram, Chennai from May 2015 to May 2016.

TYPE OF STUDY: Cross sectional study

SELECTION CRITERIA:

The duration of study was about one year .Women with preeclampsia and normotensive antenatal women who were attending our outpatient and inpatient department after 20 weeks of gestation, were counselled for investigating thyroid function tests . In our study 200 preeclampsia patients were compared with 200 normotensive age and gestational age matched controls. Free T3,free T4 and TSH were done for both the groups.

INCLUSION CRITERIA: 18 to 35 yrs**,** pregnancies complicated by preeclampsia.**,** singleton pregnancies, patient willing to give consent for the study.

EXCLUSION CRITERIA: Other hypertensive disorders of pregnancy (chronic hypertension, gestational hypertension, eclampsia), women with known thyroid disorders or on drugs for thyroid disorders, multiple pregnancies, patient on any drugs known to affect thyroid functions, other medical disorders complicating pregnancy, patient not willing to give consent.

METHOD OF STUDY:

Five ml of fasting venous blood was obtained from each patient from the cubital vein in (a) preeclamptics once it is diagnosed but before initiation of the treatment and (b) the normotensive controls. Thyroid function tests (FT3,FT4,TSH)were done for both the groups by chemiluminescence ELISA(CMIA).The results were analysed and its correlation with preeclampsia was done.

STATISTICAL ANALYSIS:

Continuous variables are expressed as mean and standard devi-

ation whereas categorical variables are expressed as frequency and percentage. Categorical variables between groups are analysed using Chi square test or Fisher's exact test based on number of observations. Between groups means were compared using independent sample t test. A two sided P value <0.05 was

taken as statistically significant.

OBSERVATION AND RESULTS:
The baseline characteristics of study population are tabulated in table 1.

Table 1

Parameter	controls	patients	P value
Age ±SD	23.99±3.5	24.36±4.25	0.35
Gestational age	34.9±3.4	34.7±2.9	0.66

As seen in table 1 both the groups were equally distributed with respect to age and gestational age (P 0.35 and 0.66 respectively).

The other parameters are given in table 2.

TABLE 2

Variable	group	N	Mean	Std. Deviation	P value
BMI	Patients	200	29.103	4.2763	0.001
	controls	200	23.904	2.9348	
BP	Patients	200	151.14	8.212	<0.0001
	Controls	200	121.47	71.113	

T h ere is a significant difference of BMI and BP between the groups (P is 0.001 for BMI and <0.0001 for BP). The preeclamptic patients were significantly overweight than their normotensive counterparts.

Thyroid function tests were done in both the groups. The tests done were free T3, free T4 and TSH. The results are shown in table 3.

TABLE 3

Variable	Group	N	Mean	SD	P value
FT3	Patients	200	2.213	0.3621	<0.0001
	Controls	200	2.396	0.4452	
FT4	Patients	200	1.240	0.2337	<0.0001
	Controls	200	1.351	0.2454	
TSH	Patients	200	3.1289	2.01076	<0.0001
	Controls	200	2.2479	1.07183	

The mean FT3 and FT4 levels in both the groups were within the normal range. There is also a significant difference in FT3 and FT4 between the groups(P<0.0001),with preeclampsia patients having meanFT3 and FT4 lower than the controls..TSH levels were significantly more

for the preeclamptic group (3.12 vs 2.24, P<0.0001).

The thyroid function tests in severe as compared to mild preeclampsia is given in table 4.

TABLE 4

Variable	Severity	N	Mean	SD	P value
FT3	Severe	41	1.985	0.3046	<0.0001
	mild	159	2.271	0.3532	
FT4	Severe	41	1.104	0.2230	<0.0001
	mild	159	1.275	0.2240	
TSH	Severe	41	5.2949	2.58681	<0.0001
	mild	159	2.5703	1.36632	

There were 41 patients with severe PE as compared to 159 in the mild PE group.As is shown in table 4 , the TFT abnormalities were more common in the severe PE group as compared to the mild PE group. The TSH was significantly more in severe PE as compared with mild PE(P <0.0001). Both the FT3 and FT4 were numerically less in the severe PE group than the mild PE group with the P value being statistically significant (P<0.0001).

The relation between the onset of preeclampsia and the TFTs is compared and shown in table 5.

TABLE 5

Variable	Onset(weeks)	N	Mean	SD	P value
FT3	≤34	67	2.158	0.3197	0.130
	>34	133	2.240	0.3799	
FT4	≤34	67	1.224	0.2436	0.473
	>34	133	1.249	0.2291	
TSH	≤34	67	3.1224	2.11331	0.974
	>34	133	3.1321	1.96526	

There were 67 patients in the PE group where the disease has occurred before 34 weeks and 133 in the ≥ 34 group. Thyroid function tests were comparable in both the groups(P statistically not significant).

DISCUSSION:
In this present study we have studied the prevalence of hypothyroidism in preeclamptic patients and the correlation between hypothyroidism and the severity of preeclampsia. The patients were divided into two groups; one group containing 200 preeclamptic patients and the control group of 200 normotensive subjects.

The age distribution of patients included in our study ranged from 18 to 35 years. Majority of them belonged to the less than 25 years age group in both the groups. The mean age of the patients in control and study group was 23.99±3.5 and 24.36±4.25 years respectively(P=0.35). Both the groups were comparable with respect to their gestational age too(-controls-34.9±3.4 weeks and study group 34.7±2.9 weeks) (p=0.66).

I n a similar study done by Ashokkumar et al, comparing pre-eclamptics with normotensive women, the mean age of the study group and the control group was 28.4 ± 6.24 years and 27.5±5.91 years respectively which is quite similar to our subjects. The mean gestational age when TFT was done was 34.3±2.92 weeks in the study group and 35.1 ± 2.86 weeks in the control group which is similar to our present study.

BMI in the present study is significantly more in the study group as compared to the controls (p=0.001).The preeclamptic patients were significantly overweight compared to the normotensive controls.

TSH, free T3 ,free T4 were done for both the groups and the results were analysed. The control group in our study had

158 euthyroid subjects (86.34%) ,24 subclinical hypothyroids(13.11%) and one overt hypothyroid(0.55%) . In the preeclampsia group 109 were euthyroids (54.5%), 86 are subclinical hypothyroids (43%),5 are overt hypothyroids(2.5%). These findings are in accordance with the previous literature stating that preeclamptic women have a higher incidence and prevalence of biochemical hypothyroidism than the normotensive population.

The mean free T3 levels in both the groups were within the normal range ,with the PE group having numerically less FT3 than the controls. The P value is statistically significant (P <0.0001). The mean free T4 values remains within the normal trimester specific range. However the PE group had a mean FT4 level which was lower than the controls and the difference was significant statistically (p <0.0001). The mean TSH value in the preeclamptic group is more than the controls and is significant (P<0.0001).The mean TSH in the preeclamptic group is 3.1289 which is above the cut off for diagnosing SCH during pregnancy in the second and third trimester. Thus subclinical hypothyroidism is more common in the preeclamptic group in the present study.

In a similar study by Ashok Kumar et al,the mean FT3 and FT4 were not significantly different in the two groups and the mean TSH value was significantly higher in the preeclamptic women than that of controls (P < 0.001).This is partly comparable to our study where the mean TSH,FT3 and FT4 are significantly different between the groups with the PE group having a high mean TSH and a low mean FT3, FT4.

In an another Indian study the mean TSH titres in the preeclamptic pregnancies has been reported to be 3.8±0.53mIU/ml while in the normal pregnancies it was 2.3±0.24mIU/ ml which again is comparable to the present study.

In the calcium for preeclampsia prevention cohort, the mean TSH values were increased 2.42 times above baseline in the PE group as compared with a 1.48 times increase in controls. The ratio of the predelivery to baseline TSH ratio of cases to that of the controls was 1.64 and there is a decrease in free T3 in preeclampsia women than in controls. Only the predelivery specimens and not the baseline TSH valueswere significantly higher than in controls .The increase in predelivery TSH values was associated with an increase in the soluble fms like tyrosine kinase and preeclampsia may also predispose to reduced thyroid functions in later years.

This study thus suggests PE as a possible risk factor for hypothyroidism and the mechanisms could be one mediated through s-fms like tyrosine kinase. Other mechanism postulated to explain hypothyroidism in PE is placental dysfunction in PE . Hypothyroidism may also play a direct role in causing pregnancy hypertension because thyroid hormones act directly on peripheral arterioles to cause dilation.

In our present study, the mean TSH is significantly higher in the preeclamptic group and FT3, FT4 significantly low. Out of the 200 preeclamptic patients,41 belonged to the severe and 159 belonged to the mild preeclampsia group. The TSH was significantly more in the severe preeclampsia group as compared to mild preeclampsia. The values of free T4 are numerically less in severe preeclampsia than mild preeclampsia and they were statistically significant.(P <0.0001). Similarly the values of free T3 are numerically less in the preeclamptics than the controls with a statistically significant P value (P <0.0001). These findings strongly suggest an association between the severity of preeclampsia and hypothyroidism.

There are evidences stating that the underlying mechanism for late-PE is the main pathophysiological processes resemble those of the metabolic syndrome with an increase in adipose tissue and impaired glucose and lipid metabolism. The association between hypothyroidism and late-PE may be mediated by the well described role of thyroid hormones in glucose homeostasis and in the synthesis, metabolism and mobilization of lipids.

CONCLUSION:

Pre eclamptics have a higher incidence of hypothyroidism (OH and SCH) in contrast to the normotensive women and there is a correlation between the severity of preeclampsia and hypothyroidism. There is no association between the onset of preeclampsia and hypothyroidism. The treatment of OH and SCH is mandatory and in future there should be a changing trend towards routine screening of hypothyroidism in contrast to targeted screening.

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