Original Research Paper

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General Medicine

STUDY OF ASSOCIATION OF THYROID DYSFUNCTION IN PRE-ECLAMPSIA AND NORMAL PREGNANCY IN MGM MEDICAL COLLEGE AND HOSPITAL, AURANGABAD.

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ABSTRACT

Background – Thyroid disorder stands secondly among endocrine disorders seen during pregnancy. Overt hypothyroidism is present with 0.3-0.5% of gestations. Subclinical hypothyroidism is seen in 2-3%, and hyperthyroidism in 0.1-0.4%. Both hypothyroidism and hyperthyroidism can have significant effect on maternal and foetal health. It has been found that pre-eclampsia has effect on thyroid gland and hence on maternal and foetal health.

Methodology - A hospital based prospective comparative study on 168 pre-eclamptic and normal pregnant women for total 18 months.

Results – In our study both the groups were comparable in view of age , parity, gestational age ($p>0.05$). There was a significant difference between pre-eclampsia and control group in terms of thyroid status , mean levels of thyroid hormone, Blood Pressure, severity of Preeclampsia ($p<0.05$). . There was significant association difference between pre-eclampsia and control group in view of thyroid status and severity of Preeclampsia (odds ratio> 1). While there was no significant difference between pre-eclampsia and control group in terms of mode of delivery, Maternal Complications, APGAR Scores of Neonates and Fetal Outcomes ($p>0.05$).

Conclusion- Perceptible association is seen amid hypothyroidism and pregnancy. So, severity of hypothyroidism may reflect degree of preeclampsia. . Hence, screening for thyroid disorders during pregnancy should be done in order to take timely measures to prevent preeclampsia and other related complications.

KEYWORDS : thyroid dysfunction, pre-eclampsia, thyroid hormones

INTRODUCTION

Thyroid disorder stands secondly among endocrine disorders seen during pregnancy. Overt hypothyroidism is present with 0.3-0.5% of gestations. Subclinical hypothyroidism is seen in 2-3%, and hyperthyroidism in 0.1-0.4%.[1] In pregnant women, autoimmune thyroid dysregulation is a major cause for both hyperthyroidism and hypothyroidism. Hashimoto thyroiditis is the most frequently seen cause of hypothyroidism and Graves disease is seen in 85% of hyperthyroid cases. 0.4 and 1.7 % pregnancies are complicated due to overt hyperthyroidism.[2] Around 2–3 % of women may be diagnosed hypothyroid in the course of pregnancy. Overt hyperthyroidism seen in 0.4–1.7 % of pregnant females.[3]

Hypothyroidism seen in pregnancy affects adversely both mother and child. Kids of untreated and undertreated females affects majorly intellectual development. In thyroid dysfunctional women, overt and subclinical pregnancy-related adverse outcomes like threatened abortion, abruptio placentae ,preeclampsia, preterm labour and PPH (post partum haemorrhage) are observed. Also Fetal complications like low birth weight babies, spontaneous first-trimesters abortions, hyperthyroidism in fetus, preterm labour, IUGR(Intrauterine Growth Retardation), high rates of neonatal deaths and still births, neonatal jaundice, more cases of neonatal hypothyroidism, and increased perinatal mortality are seen.[4] Hypothyroidism is the common type of thyroid dysfunction in gestation, which has been associated with IUFD (Intrauterine Fetal Death), preterm delivery, pregnancy-induced hypertension, abruptio placentae and intellectual impairment in the child.[5]

Across the globe, pre-eclampsia is one of the major reasons behind fetal and maternal mortality and morbidity. Pre-eclampsia is defined as a multisystem disorder of pregnancy, which is characterized by Hypertension (blood pressure > 140/90mmHg) associated with proteinuria (urinary protein excretion of > 300mg/l in 24 h specimen) post 20 weeks of gestation.[6] During normal pregnancy, changes in TFTs (Thyroid Function Tests) are seen. During pregnancy, there is raised demand from thyroid and high uptake of iodine and production of thyroid hormones is also high. Although hypothyroxinaemia is seen in normal pregnancy, it is observed more commonly with pre-eclampsia. According to research done to observe the effect of pre-eclampsia on thyroid gland, it is seen that pre-eclampsia affects TSH (Thyroid stimulating hormone) concentrations and hence pre-eclamptic patients have high risk of low birthweight neonates.[7] Pregnancy also shows increased T4 levels. In preeclampsia, biochemical hypothyroidism (raised thyroid-stimulating hormone [TSH]) is seen.[14] Hypothyroidism is seen as one of the major causes of high BP.[8]

Therefore this study was done at our tertiary care centre to study the prevalence of thyroid dysfunction and pregnancy outcome in pre-eclamptic and normal pregnant women.

MATERIAL AND METHODS

Study Design: A hospital based prospective comparative study.

Study Duration: 18 months

Study Area: Department of Medicine, MGM Medical College & Hospital, Aurangabad on attending OPD/IPD.

Study Population: All Pre-eclamptic and normal pregnant women admitted in the department of obstetrics and gynaecology

Sample Size:

Sample size was calculated using the formula: $n= [z2p(1-p)]/d2$

Where: Z = table value of alpha error from Standard Normal Distribution table (0.95)

Power (p) = 80%, Precision error of estimation (d) = 4.25%

$n= [0.95 \times 0.95 \times 0.8 (0.2)] / 0.0425 \times 0.0425 = 83.3$

84 patients per group was required to detect a significant difference and hence sample size of 168 patients were selected for the study.

168 patients divided into following groups:

Preeclampsia Group: 84 pregnant women with preeclampsia.

Control Group: 84 pregnant normotensive healthy women.

Inclusion Criteria

1.Patients of pre eclampsia in third trimester of pregnancy.
2.Normotensive pregnant women in third trimester of pregnancy.

Exclusion Criteria

1.Known case of thyroid disorder.
2.History of renal disease.

Statistical Analysis

Quantitative data can be expressed in the form of Mean and Standard deviation. Control among the study groups is done using unpaired t test according to results of normality test. Qualitative data is expressed with the help of frequency and percentage table. Association among the study groups is studied with Fisher test, student 't' test and Chi-

Square test. 'p' value if less than 0.05 is taken as significant.

Appropriate statistical software, including but not restricted to MS Excel, SPSS ver. 20 will be used for statistical analysis. Graphical representation will be done in MS Excel 2010.

OBSERVATIONS AND RESULTS

A hospital based comparative study was conducted to assess the prevalence of thyroid dysfunction and pregnancy outcome in pre-eclamptic and normal pregnant women.

Table 1: Distribution Of Patients According To Age

Age (years)	Preeclampsia Group		Control Group		p Value
	N	%	N	%	
18-20 years	9	10.7%	11	13.1%	>0.05
21-25 years	36	42.9%	34	40.5%	
26-30 years	25	29.7%	27	32.1%	
>30 years	14	16.7%	12	14.3%	

The mean age in Preeclampsia Group was 25.76 ± 4.44 years and in Control Group was 25.55 ± 4.47 years. There was no significant association between the groups as per Student t test (p>0.05). (table1)

Table 2: Distribution Of Patients According To Parity

Parity	Preeclampsia Group		Control Group		p Value
	N	%	N	%	
Primigravida	59	70.2%	56	66.7%	>0.05
Multigravida	25	29.8%	28	33.3%	
Total	84	100%	84	100%	

59 (70.2%) patients in Preeclampsia Group were primigravida while 25 (29.8%) patients were multigravida. 56 (66.7%) patients in Control Group were primigravida while 28 (33.3%) patients were multigravida. There was no significant difference between the groups as per Chi-Square test (p>0.05). (table2)

Table 3: Distribution Of Patients According To Gestational Age

Gestational Age	Preeclampsia Group		Control Group		p Value
	N	%	N	%	
<37 weeks	48	57.1%	37	44.1%	>0.05
≥37 weeks	36	42.9%	47	55.9%	
Total	84	100%	84	100%	
Mean ± SD	36.33 ± 2.45		37.25 ± 2.56		

The mean gestational age of Preeclampsia Group (36.33±2.45 weeks) and Control Group (36.33±2.45 weeks) was comparable(p>0.05as per Student t-test). (table3)

Table 4: Distribution Of Patients According To Thyroid Status

Thyroid Status	Preeclampsia Group		Control Group		
	N	%	N	%	
Subclinical Hypothyroid	16	19.1%	6	7.1%	OR = 4.80 95% CI 2.59–6.09 p<0.05
Subclinical Hyperthyroid	5	5.9%	2	2.4%	
Overt Hypothyroid	4	4.8%	2	2.4%	
Overt Hyperthyroid	2	2.4%	1	1.2%	
Euthyroid	57	67.8%	73	86.9%	
Total	84	100%	84	100%	

There was a significant association between pre-eclampsia and thyroid hypofunction (overt and sub clinical hypothyroidism) (**p<0.05**). Odds-ratio indicates that preeclampsia group have chance of higher TSH by 4.8 times. (table 4)

Table 5: Distribution Of Patients According To Mean Levels Of Thyroid Hormone

Parameters	Preeclampsia Group		Control Group		p Value
	Mean	SD	Mean	SD	
T3 (ng/dL)	126.44	14.11	153.49	54.47	<0.05
T4 (µg/dl)	9.42	2.62	10.20	2.07	<0.05
TSH (µIU/ml)	5.12	4.61	4.19	3.33	<0.05

The mean T3 and mean T4 was significantly lower in Preeclampsia Group compared to Control Group as per Student t-test (**p<0.05**). The mean TSH was significantly higher in Preeclampsia Group compared to Control Group as per Student t-test (**p<0.05**). (table5)

Table 6: Distribution Of Patients According To Blood Pressure Parameters

Parameters	Preeclampsia Group		Control Group		p-Value
	Mean	SD	Mean	SD	
SBP (mmHg)	148.99	6.67	108.73	6.98	<0.05
DBP (mmHg)	96.19	6.44	73.74	9.38	<0.05

(SBP- Systolic blood pressure, DBP- Diastolic blood pressure)

Mean SBP and mean DBP was significantly higher in Preeclampsia Group compared to Control Group as per Student t-test (**p<0.05**). (table 6)

Table 7: Correlation of Thyroid Status and severity of Preeclampsia

Thyroid Status	Preeclampsia						
	Mild		Severe		Total		
	N	%	N	%	N	%	
Subclinical Hypothyroid	6	7.2%	10	11.9%	16	19.1%	OR = 3.42 95% CI 1.84–5.61 p<0.05
Subclinical Hyperthyroid	2	2.4%	3	3.6%	5	5.9%	
Overt Hypothyroid	1	1.2%	3	3.6%	4	4.8%	
Overt Hyperthyroid	1	1.2%	1	1.2%	2	2.4%	
Euthyroid	35	41.7%	22	26.1%	57	67.8%	
Total	45	53.6%	39	46.4%	84	100%	

There was significant association between severity of pre-eclampsia and thyroid hypofunction (**p<0.05**). Odds ratio suggests that severe preeclamptics have 3.42 times more risk of thyroid hypofunction. (table7)

Table 8: Distribution Of Patients According To Mode Of Delivery

Mode of Delivery	Preeclampsia Group		Control Group		p Value
	N	%	N	%	
Vaginal Delivery	61	72.6%	64	76.2%	>0.05
LSCS	23	27.4%	20	23.8%	
Total	84	100%	84	100%	

There was no significant difference between the groups as per Chi-Square test (p>0.05). (table8)

Table 9: Distribution Of Patients According To Maternal Complications

Maternal Complications	Preeclampsia Group		Control Group		p Value
	N	%	N	%	
PPH	20	23.8%	13	15.5%	>0.05
Anaemia	16	19.1%	11	13.1%	
Oligohydraminos	11	13.1%	8	9.5%	
GDM	9	10.7%	5	5.9%	
Abruption	4	4.8%	3	3.6%	

There was no significant difference between the groups as per Chi-Square test (p>0.05). (table 9)

Table 10: Comparison Of Birth Weight Of Neonates

Birth Weight Of Neonates	Preeclampsia Group		Control Group		p Value
	Mean	SD	Mean	SD	
Weight	2.09	0.52	2.62	0.49	<0.05

The mean birth weight of neonates (2.09±0.52kg vs. 2.62±0.49kg) was significantly lower in Preeclampsia Group compared to Control Group as per Student t-test (**p<0.05**). (table 10)

Table 11: Comparison Of APGAR Scores Of Neonates

APGAR Scores	Preeclampsia Group		Control Group		p Value
	Mean	SD	Mean	SD	
At 1 min	8.02	1.50	8.23	1.26	>0.05
At 5 mins	8.15	1.36	8.55	1.20	>0.05

The APGAR Scores at 1 min and APGAR Scores at 5 mins was comparable between the groups as per Student t-test (p>0.05). (table11)

Table 12: Distribution Of Patients According To Fetal Outcomes

Fetal Outcomes	Preeclampsia Group		Control Group		p Value
	N	%	N	%	
Low Birth Weight	13	15.5%	9	10.7%	>0.05

NICU Admission	6	7.1%	3	3.6%	
IUGR	4	4.8%	3	3.6%	
Fetal Distress	1	1.2%	2	2.4%	

There was no significant difference between the groups as per Chi-Square test (p>0.05). (table12)

DISCUSSION

A hospital based comparative study was done to assess the prevalence of thyroid dysfunction and pregnancy outcome in preeclamptic and normal pregnant women.

Pre-eclampsia is an important problem of pregnancy with unidentified aetiology occurring probably in second or third trimester. Improper functioning of placenta and production of estrogen along with reduced change of T4 to T3, and improper endothelial functioning in preeclampsia, play a noteworthy role in the pathogenesis. Also nitric oxide release from endothelium might be a pathogenetic mechanism in preeclampsia. Placental dysfunction withdraws the fetus from appropriate oxygen and nutrient supplies. This might lead to compromised fetal state and a low T4 syndrome may be seen.[9]

In this study, both the groups were comparable in view of age , parity, gestational age (p>0.05) (table1,2,3). This is similar to the studies of Deshpande S et al[10], Murmu AK et al[11], Tadas SA et al[12] and Muraleedharan N et al[13].

There was a noteworthy association amid pre-eclampsia and thyroid hypofunction (overt and sub clinical hypothyroidism) (**p<0.05**). Odds-ratio shows that preeclamptic female cluster have a higher TSH by 4.8 times (table 4). This is concordant to the study of Murmu AK et al[11].

In this study, the mean T3 and mean T4 was significantly lower in Preeclampsia Group compared to Control Group as per Student t-test (**p<0.05**). The mean TSH was significantly higher in Preeclampsia Group compared to Control Group as per Student t-test (**p<0.05**) (table 5). This is consistent with the studies of Muraleedharan N et al[13], Deshpande S et al[10].

In our study, the mean SBP and mean DBP was significantly higher in Preeclampsia Group compared to Control Group as per Student t-test (**p<0.05**) (table 6). This is in concordance to the studies of Tadas SA et al[12] and Kharb S et al[14].

In our study, there was significant association between severity of pre-eclampsia and thyroid hypofunction (overt and sub clinical hypothyroidism) (**p<0.05**). Odds ratio indicates that severe preeclampsia group have 3.42 times more chance of thyroid hypofunction (table 7). These findings were consistent with the studies of Deshpande S et al[10], Sardhana D et al[15], Tadas SA et al[12], Kharb S et al[14] and Muraleedharan N et al[13].

There was no noteworthy difference between the groups in terms of mode of delivery , Maternal Complications and APGAR Scores at 1 min and 5 mins between preeclampsia group and control group as per Chi-Square test (p>0.05) (table 8,9,11). The mean birth weight of neonates was significantly lower in Preeclampsia Group compared to Control Group as per Student t-test (**p<0.05**) (table 10). Kharb S et al[14] and Sardhana D et al[15] noted similar observations in their studies.

There was no significant difference between the groups in terms of fetal outcomes as per Chi-Square test (p>0.05) (table 12). Similar observations were noted in the study of Kharb S et al[14].

CONCLUSION

Perceptible association is seen amid hypothyroidism and pregnancy. So, severity of hypothyroidism may reflect degree of preeclampsia. Also, it was found that serum TSH was remarkably high in preeclampsia. Hence, screening for thyroid disorders during pregnancy should be done in order to take timely measures to prevent preeclampsia and other related complications.

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