

Correlation of Hypothyroidism with Pregnancy Outcome in Preeclampsia

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Abstract: Background- Thyroid disorders constitute one of the most common endocrine disorders in pregnancy. It is associated with adverse maternal outcomes including eclampsia, pre-eclampsia, placental abnormalities, miscarriages, pre-term labor, and low birth weights.

Material and Methods- The present study was carried out on the pregnant women in their second and third trimesters attending outpatient department of obstetric and gynaecology from October 2012 to September 2014. 100 Preeclamptic women were included in the study group and 50 normotensive women were included in the control group. Both groups were screened for hypothyroidism and were followed through their antenatal, intranatal and postnatal period.

Results- Increased incidence of preterm labour, antepartum haemorrhage, IUGR found in cases of preeclampsia with high serum TSH. Significant negative correlation was observed between birth weight and mean arterial pressure. Positive correlation seen between Birthweight and T4 and T3, negative correlation between TSH and birth weight in cases of preeclampsia. No significant difference found in caesarian rate between preeclampsia with high serum TSH and those with normal serum TSH

Conclusion- In the present study, serum TSH was significantly higher in preeclamptic women than in normotensive women and fT3 and fT4 were slightly lower in preeclamptic women. Also increase in serum TSH is associated with adverse maternal and fetal outcome. Hence timely intervention in term of supply of thyroid hormone may overcome these adverse effects.

Keywords- Preeclampsia, thyroid stimulating hormone, pregnancy, birth weight

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I. Introduction

Preeclampsia is a multisystem disorder of unknown etiology and is a major cause of maternal and fetal morbidity and mortality. It complicates 2-8% of pregnancies and account for more than 50,000 maternal deaths worldwide. Pregnancy is associated with hyperthyroxinemia while hypothyroidism occur in preeclampsia. In preeclampsia, there is failure of estrogen production due to placental dysfunction, resulting in lowering of TBG, TT3 and TT4 that result into biochemical hypothyroidism. It also result in growth restriction of fetus. Women with thyroid dysfunction overt and subclinical are at increased risk of pregnancy related complications such as threatened abortion, preeclampsia, preterm labour, placental abruption, and postpartum hemorrhage. Fetal complications include low birth weight babies, preterm deliveries, intrauterine growth restriction, fetal loss, still birth and neonatal death. Thyroid hormone plays a critical role in fetal brain development. For the first 12 weeks, fetus depends entirely on thyroid hormone. The decrease in thyroid hormones with concomitant increase in TSH titers has been found to be correlated with the severity of preeclampsia.

Also it has been observed that preeclamptic and eclamptic women with higher TSH levels along with lower thyroid hormones are more likely to have small for gestation newborns. TT4 and TT3 concentrations in preeclamptic and eclamptic women correlated positively with the birth weight of their infants. Lao et al (1990) observed a negative correlation between the birth weight of the infants and TSH levels in preeclamptic patients.

II. Material And Methods

This study was carried out in the department of Obstetrics and Gynaecology from October, 2012 to September, 2014. In present study, pregnant women in their second and third trimesters were studied. 100 preeclamptic women were included in the study group and 50 normotensive women were included in the control group. Both groups were screened for hypothyroidism and were followed through their antenatal, intranatal and

postnatal period. . Inclusion criteria of preeclampsia were blood pressure of >140/90mmHg on atleast two occasions , six hours apart and or proteinuria. Exclusion criteria were: history of chronic hypertension, any renal disease, any metabolic disorder or medication that may affect thyroid function. Study samples for thyroid hormone assay were drawn before starting any treatment. The current third generation chemiluminescent immunoassays for detection and quantification of TSH is used. Following the most recent guideline recommended by Endocrine Society and American Thyroid Association (ATA), upper limit value of 2.5 mIU/L for preconception and the first trimester and 3.0 mIU/L Sr TSH for the second and third trimesters is used. Both groups were screened for hypothyroidism and were followed through their antenatal, intranatal and postnatal period. Data were entered and analysed in MS Excel. Ethical clearance was taken from ethical committee.

III. Results

TABLE- 1 SHOWING DISTRIBUTION OF CASES IN STUDY AND CONTROL GROUP

CASES	NUMBER	PERCENTAGE %
STUDY	100	66.66
CONTROL	50	33.33

Total number of cases in the study group were 100 and 50 in the control group.

TABLE- 2 SHOWING AGE DISTRIBUTION OF CASES IN STUDY AND CONTROL GROUPS

AGE GROUPS	STUDY N=100	CONTROL N=50
<20	15	9
20-24	54	19
25-30	23	18
>30	8	4

Maximum number of cases were in the age group 20-30 years.

TABLE – 3 SHOWING THYROID FUNCTION TEST OF NORMOTENSIVE AND PREECLAMPTIC PREGNANT WOMEN

PARAMETERS	STUDY	CONTROL	p=value
TSH (mIU/L) Mean ±SD	2.407±1.71	1.5±0.9546	0.00066
fT3 (pg/ml) mean±SD	1.422±0.621	1.604±0.63	0.09654
fT4 (ng/dl) mean	0.933±0.404	1.08±0.393	0.031

In my study, mean sTSH of the study and the control groups were 2.407±1.71mIU/L and 1.5±0.9546mIU/L. There was statistically significant difference between the two groups. (p<0.05). fT3 and fT4 were slightly higher in control group but this was not statistically significant.

TABLE – 4 SHOWING DISTRIBUTION OF NORMAL AND INCREASED SERUM TSH LEVEL IN BOTH THE STUDY AND CONTROL GROUPS

GROUPS	STSH <3mIU/L	STSH >3mIU/L	TOTAL	ODDS RATIO
CONTROL	44	6	50	5.31
STUDY	58	42	100	
TOTAL	102	48	150	

Out of 100 preeclamptic women in study group, 42 had sTSH >3mIU/L.

Out of 50 normotensive pregnant women in the control group, 6 had sTSH> 3mIU/L.

Hence, 42 out of 48 pregnant women with sTSH >3mIU/L had preeclampsia and 58 out of 102 pregnant women with normal sTSH level had preeclampsia. Odds ratio = 5.3

Hence this difference between the two groups is statistically significant. (p<0.05).

TABLE – 5 SHOWING MATERNAL OUTCOME IN WOMEN IN STUDY AND CONTROL GROUPS

MATERNAL OUTCOME	PREECLAMPSIA		NORMOTENSIVE	
	TSH<3	TSH>3	TSH<3	TSH>3
ANEMIA	3	6	0	2
PRETERM LABOUR	3	5	1	3
APH	1	2	0	0
PPH	2	2	1	0

Incidence of maternal complications like anemia, preterm labour, APH, PPH were more in preeclamptic women with raised serum TSH level than those with normal serum TSH level

TABLE – 6 SHOWING MODE OF DELIVERY IN PREECLAMPTIC WOMEN WITH NORMAL AND RAISED SERUM TSH LEVEL AND IN NORMOTENSIVE WOMEN

MODE OF DELIVERY	PREECLAMPTIC STSH<3mIU/L	PREECLAMPTIC STSH>3mIU/L	NORMOTENSIVE		TOTAL
			STSH<3mIU/L	STSH>3mIU/L	
VAGINAL	49	35	43	5	132
CAESARIAN	9	7	1	1	18

Caesarian rate was almost the same in preeclampsia with normal serum TSH level and in those with raised serum TSH level.

TABLE – 7 SHOWING CORRELATION OF BIRTH WEIGHT WITH MEAN ARTERIAL PRESSURE OF PREECLAMPTIC WOMEN WITH DIFFERENT SERUM TSH LEVEL

PARAMETERS	NORMAL TSH LEVEL N=58	RAISED TSH LEVEL N=42
MAP (MEAN±SD) mmHg	117.82±4.53	118.806±4.00
BIRTH WEIGHT (MEAN±SD)KG	2.52±0.49	2.29±0.46

In my study, birth weight of the babies of preeclamptic women were found to be inversely correlated with Sr TSH level and mean arterial pressure.

TABLE- 8 SHOWING CORRELATION OF BIRTH WEIGHT WITH THYROID HORMONES IN CASES OF PREECLAMPSIA

PARAMETERS	STUDY Sr TSH>3mIU/ml	STUDY Sr TSH<3mIU/ml
Sr TSH(mean±SD)mIU/ml	4.10±1.28	1.08±0.39
fT3(mean±SD)pg/ml	1.422±0.621	1.604±0.63
fT4(mean±SD)ng/dl	1.0733±0.404	1.08±0.393
Birth weight(mean±SD)Kg	2.448±0.498	2.775±0.387

Birth weight is more in preeclamptic women with lower Sr TSH and higher fT3 and fT4.

TABLE – 9 SHOWING DISTRIBUTION OF BIRTH WEIGHT IN STUDY AND CONTROL GROUPS OF PATIENTS

BIRTH WEIGHT	STUDY GROUP		CONTROL GROUP	
	STSH<3mIU/L N=58	STSH>3mIU/L N=42	STSH<3mIU/L N=44	STSH>3mIU/L N=6
<2KG	8(13.79%)	8(19.04%)	1(2.27%)	2(33.33%)
2-2.5KG	7(12.06%)	13(30.95%)	2(4.45%)	2(33.33%)
2.5-3KG	42(87.5%)	20(47.61%)	40(90.90%)	1(16.66%)
>3KG	1(1.72%)	1(2.38%)	1(2.27%)	1(16.66%)

Incidence of birth weight less than 2.5 kg was more in cases of preeclamptic women than in normotensive women. Moreover incidence of birth weight <2.5 kg was found to be higher in preeclamptic women with raised serum TSH level than in those with normal serum TSH.

TABLE – 10 FETAL OUTCOME IN THE STUDY AND THE CONTROL GROUPS OF PATIENTS

FETAL OUTCOME	STUDY		CONTROL	
	sTSH<3mIU/L	sTSH>3mIU/L	sTSH<3	sTSH>3
LIVE BIRTH	56	39	44	5
PRETERM BIRTH	10	15	1	3
IUGR	3	4	0	0
LBW	13	17	1	3
STILL BIRTH	2	3	0	1

Fetal complications were more in the study group with raised serum TSH level than those with normal serum TSH level and in control group.

IV. Discussion

This study was conducted in the Obstetrics and Gynaecology department of PMCH, Patna to determine the thyroid hormone levels in cases of 100 preeclamptic women and 50 matched controls in the second and third trimester and to relate with the pregnancy outcome. Number of cases studied were 100 in study group and 50 in control group (table 1) and maximum number of the cases belonged to 20-30 years (table 2). It was in correlation with a study by Sardana et al. (2009) who also studied 100 preeclamptic women and 50 normotensive women. Also in a study carried out in Bucharest University Emergency hospital by Rodiac Todusa (2010), patients studied were between 18-35 years.

The mean (\pm SD) TSH of the study and control group was 2.407 ± 0.171 mIU/L and 1.5 ± 0.954 mIU/L respectively and there was highly significant difference between the two groups ($p<0.05$). The mean (\pm SD) fT3 of the study group and control group were 1.422 ± 0.621 pg/ml and 1.604 ± 0.63 pg/ml respectively and there was no statistically significant difference between the two groups ($p>0.05$). The mean (\pm SD) fT4 level was 0.933 ± 0.404 ng/dl and 1.08 ± 0.393 ng/dl in the study group and in the control group. The difference between the two groups was not statistically significant ($p<0.05$). It was similar to the study carried out by khaliq et al (1998) in which he found that serum t3 and t4 were decreased and sTSH was significantly increased in cases of preeclampsia as compared to normal pregnancy. Kumar A et al. (2005) in the antenatal clinic of a public hospital of Delhi found the mean (\pm SD) TSH of the study group and control group were 4.6 ± 3.64 mIU/l and 2.5 ± 2.01 mIU/l respectively and there was highly significant difference between the two groups. ($P<0.05$)

Reduced concentration of t3 and t4 levels might be explained by the loss of protein and protein bound hormones. Since t3 is mostly the product of peripheral conversion of t4, the involvement of organs such as liver and kidney contributes to low level of t3.

Also incidence of preterm labour, antepartum haemorrhage (table 5) was found to high in preeclamptic women with raised serum TSH. In 1969, Jones and man reported higher incidence of preterm delivery of 19.6% in his study. Davis et al in (1996) his study reported 44% incidence of preterm delivery in hypothyroid. Cunningham and lindheimer (1992) found that thyroid disorder causes preeclampsia in 5-10% , preterm deliveries in 10-15% and placental abruption in 1%. In this study, rate of caesarian section was higher in preeclamptic women with high serum TSH (table 12). Allen et al (2000), Casey et al (2007), li et al (2009) in their study found increased rate of cesarean section in cases of hypothyroidism. Sahu et al (2010) studied 633 pregnant women and found positive correlation between hypothyroidism and significant adverse effect on maternal and fetal outcome.

A significant negative correlation was observed between birth weight and mean arterial pressure level (table 7). It was similar to other studies. S. Kharb et al. (2013) found significantly mean arterial pressure and low birth weight in preeclamptic women with raised serum TSH level. This may be explained by placental dysfunction in preeclamptic women causing growth failure of fetus. My findings were in agreement with those reported in literature. A positive correlation found between Ft3, Ft4 and birth weight (table 8). Basbug et al. (1990) observed a positive correlation between BW and T3 and T4 and a negative correlation between sTSH and BW. Also Sardana et al (2009) in her study observed significant negative correlation between birthweight and TSH level. In contrast Kaya et al (1994) observed no correlation between thyroid hormones level with birth weight of babies. Also the occurrence of fetal distress, fetal death and intrauterine growth restriction were found to be higher in preeclamptic women with hypothyroidism showed in table 9. These findings corresponded with other studies. Allen et al. (2000) showed that TSH level greater than 6mIU/L were significantly associated with higher frequency of still birth. Bendahi et al. (2009) found that high maternal TSH levels were associated with an increased risk of pregnancy loss. Goel et al reported higher incidence of fetal distress in pregnancies complicated by maternal hypothyroidism.

V. Conclusion

Negative correlation was observed between birth weight and serum TSH level in preeclamptic women. Also hypothyroidism was found to be associated with adverse maternal and fetal outcome. Thyroid screening

and identification of hypothyroidism during pregnancy can predict preeclampsia and help in preventing its occurrence by timely intervention in terms of thyroid hormone administration in appropriate measures.

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