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Original Research Article

Prevalence of hypothyroid dysfunction among third trimester pregnant women and its effect on maternal and fetal outcome

Arundati Kanawala*, Gulab Singh Shekhawat

Department of Obstetrics and Gynecology, Smt. Kashibai Navale Medical College and General Hospital, Pune, Maharashtra, India

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***Correspondence:**
Dr. Arundati Kanawala,
E-mail: arundati99@gmail.com

ABSTRACT

Background: Thyroid disorders are the predominant endocrinological afflictions of pregnancy that if were to affect the mother and her child, would lead to various complications.
Methods: A randomized study among 450 third trimester admitted cases for any indication were subjected to thyroid functions by TSH, Free T4 and TPO Ab. Total 61 mothers (54 hypothyroidism and 7 sub clinical hyperthyroidism) had thyroid dysfunction. These 54 hypothyroid mothers were further evaluated during the remaining course of gestation for feto-maternal outcomes.
Results: Out of 450 third trimester ANC cases 61(13.5%) had deranged thyroid functions in third trimester. Out of 61patients, 18 (29.50%) patients had TPO Ab positive. Prevalence of subclinical hypothyroidism, overt hypothyroidism, and subclinical hyperthyroidism was 9.6%, 2.45%, and 1.5%, respectively. Anemia was found in 9.3% of SCH and 27.3% cases in OH cases. Preeclampsia was found in 16.2% cases of SCH and 18.2% cases in OH cases. Gestational diabetes mellitus was noticed among 16.27% cases of SCH and 18.18% cases of OH. Previous abortions were present among 65.1% cases of SCH and 45.45% cases of OH. Placental abruption and cardiac failure were observed in 4.65% and 2.34% of SCH only. Cesarean delivery occurred in 18.6% of SCH and 36.36% of overt hypothyroidism.
Conclusions: This study concludes a high prevalence of thyroid disorders as subclinical hypothyroidism (9.6%), overt hypothyroidism (2.5%) and subclinical hyperthyroidism (1.5%) in third trimester pregnancy.

Keywords: Overt hypothyroidism, Sub clinical hypothyroidism, Thyroid stimulating hormone

INTRODUCTION

Thyroid disorders are the second most common endocrine problem in pregnancy after diabetes.[1] Overt or symptomatic hypothyroidism complicates between 0.2 and 1.2% of pregnancies.[2] An Indian study estimates that thyroid disorders were prevalent in as high as 24.1% of pregnant woman.[3] The hypothyroid mother experiences an increased risk of abortions, intrauterine growth restrictions, preterm deliveries, anemia, placental abruptions and abnormalities, stillbirths and post-partum hemorrhage while suffering from both overt and subclinical hypothyroidism.[4] The fetus was seen to experience poor brain development and subsequently later in life, have a lower intellectual quotient. [5] Thus, maternal screening in pregnancy becomes imperative to avoid the decremental effects of thyroid disorders if detected.

During the first 12 weeks of gestation, when maternal hCG serum levels are maximal, thyroid hormone secretion is stimulated. The resulting greater serum free thyroxine (T4) levels act to suppress hypothalamic thyrotropin-releasing hormone (TRH) and in turn limit pituitary TSH secretion. Thyroid peroxidase (TPO) is a thyroid gland enzyme that normally functions to produce thyroid hormones. TPO

antibodies have been associated in some studies with early pregnancy loss and preterm birth.[5]

METHODS

TA randomized cross sectional observational study was done in the Obstetrics and Gynecology department of Smt. Kashibai Navale Medical College and General Hospital, Pune, from the years 2021 and 2022. We recruited 450 antenatal women in third trimester beyond 28 weeks of gestation, admitted into the obstetric ward with singleton pregnancy for any obstetric indications, excluding known case of thyroid disorder. Estimation for TSH was conducted among 450 women using the enhanced chemiluminescence.

Estimation of free T4 was subsequently carried out when TSH levels were found abnormal. TPO Ab test done for all cases having deranged TSH and Free T4 levels and TPO Ab level of >34IU defined as positive test. Cut off values used for TSH were those indicated by the American pregnancy and thyroid association for 3rd trimester as >0.3mIU/L to <3mIU/L. Normal free T4 level cut off was taken as 0.7 to 1.8 ng/dl. Patients with normal free T4 and high TSH were considered to have subclinical hypothyroidism whereas those with low free T4 and high TSH were considered to have overt hypothyroidism, and those with normal free T4 and low TSH were considered to have subclinical hyperthyroidism, and those with high T4 and low TSH were considered to have overt hyperthyroidism. All newly detected hypothyroid cases treated with levothyroxine (LT4) in doses of 1.20µgm/kg/day and adjusted to maintain TSH to <3mIU/L. All patients also advised to consume 1 table spoon full of iodized salt having iodine in concentration of 14.83-15 Ppm/kg to make it daily consumption of 250µgm iodine. Patients with a deranged hypothyroid profile were subsequently assessed for maternal and fetal complications. All these patients had weekly follow till six weeks of postpartum period.

Data management and analysis was conducted using Statistical Package for the Social Sciences (SPSS Version25). The study protocol was approved by the Scientific and Ethical Committee of the Institution. All the participants were also informed about the study procedure and the information that was required from them for the study. Written consent was obtained for all enrolled patients.

RESULTS

Out of 450 recruited third trimester ANC cases 61 (13.5%) had deranged thyroid functions in third trimester. Out of 61 deranged thyroid functions, 18 (29.50%) patients had TPO Ab positive. Prevalence among 450 recruited third trimester ANC cases for subclinical hypothyroidism, overt hypothyroidism, and subclinical hyperthyroidism was 9.6% (n = 43), 2.45% (n = 11), and 1.5% (n = 7), respectively (Table 1).

Table 1: Prevalence of thyroid disorders in 3rd trimester of pregnancy.

Thyroid status	Prevalence (%)	Mean TSH (mIU/L)	Mean fT4 (ng/dl)
Subclinical hypothyroidism, n = 43	9.6	6.08±1.20	1.18±0.20
Overt hypothyroidism, n =11	2.45	9.96±3.34	0.44±0.22
Subclinical hyperthyroidism, n =7	1.5	0.03±0.02	1.6±0.10
Overt hyperthyroidism	-	-	-

Table 2: Association of maternal and foetal risk factors in women with hypothyroidism (n = 61).

Complications	Hypothyroidism (n=54)	
	Subclinical (n=43) (%)	Overt (n=11) (%)
Preeclampsia	7 (16.2)	2 (18.2)
Placental abruption	2 (4.65)	-
Cardiac failure	1 (2.34)	-
Anemia (Hb <10mg%)	4 (9.30)	3 (27.3)
Gestational diabetes mellitus	7 (16.27)	2 (18.18)
History of previous abortions	28 (65.1)	5 (45.45)
Preterm delivery before 37 weeks (both spontaneous and induced labor)	11 (25.58)	3 (27.30)
Birth weight <2500gram	7 (16.30)	4 (36.36)
Oligohydramnios (AFI <5)	4 (9.30)	2 (18.18)
Caesarean section 26.3% (5)	8 (18.6)	4 (36.36)
Low Apgar score (1-min Apgar <5)	11 (25.58)	2 (18.18)
NICU admission	14 (32.55)	5 (45.45)
Stillbirth	1 (2.34)	-
Neonatal death	2 (4.65)	1 (9.09)

Out of 54 women with hypothyroidism, 43 had SCH (sub clinical hypothyroidism) and remaining 11 had overt hypothyroidism. Anemia (Hb <10mg%) was found in 4 cases (9.3%) of SCH (sub clinical hypothyroidism) and 3 (27.3%) cases in OH (overt hypothyroid) cases. Preeclampsia was observed in was found in 7 (16.2%) cases of SCH (sub clinical hypothyroidism) and 2 (18.2%) cases in OH (overt hypothyroid) cases. Associated co morbidity of gestational diabetes mellitus was noticed among 7 (16.27%) cases of SCH and 2 (18.18%) cases of OH. Significant history of previous abortions was present among 28 (65.1%) cases of SCH and 5 (45.45%) cases of OH (overt hypothyroidism). Placental abruption and cardiac failure were observed in 2 cases (4.65%) and 1 case (2.34%) of SCH only. Cesarean delivery occurred in 8 cases (18.6%) of SCH and 4 cases (36.36%) of overt hypothyroidism. Oligohydramnios (AFI <5) was noted in 4 cases of SCH (9.30%) and 2 cases (18.18%) of OH. Preterm delivery before 37 weeks (both spontaneous and induced labor) occurred in 11 (25.58%) cases in SCH and in 3 (27.30%) cases of OH. Birth weight <2500gram was recorded in 7 (16.30%) patients of SCH and 4 (36.36%) cases of OH. For 1-min Apgar score cut off value considered was 5, as an indicator for fetal asphyxia. Out of 43 sub clinical hypothyroid (SCH) women 11 (25.58%) babies had low Apgar whereas among 11 OH babies 2 (18.18%) had low Apgar score. NICU admission was associated with 14 (32.55%) babies in SCH mothers and 5 (45.45%) mothers in OH category. We also recorded 1 (2.34%) stillbirth and 2 (4.65%) neonatal death among SCH patient's category. In overt hypothyroid, category also had 1 (9.09%) neonatal death in NICU (Table 2).

DISCUSSION

Prevalence of thyroid disorder

This study found high prevalence of thyroid disorders as subclinical hypothyroidism (9.6%), overt hypothyroidism (2.45%) and subclinical hyperthyroidism (1.5%) in third trimester pregnancy. The prevalence observed in study conducted by Bajaj et al was (24.1%), by Wang et al was (10.2%) and Ajmani et al was (13.25%).[6,7] Our mean serum TSH, free T4 and TPO Ab levels in women with thyroid disorders has also been comparable with other national and international studies. [8,9,10]

Association of maternal and fetal outcome with thyroid disorder

Anemia and gestational diabetes mellitus

In the present study, anemia (Hb <10mg%) was found in 4 cases (9.3%) of SCH (sub clinical hypothyroidism) and 3 (27.3%) cases in OH (overt hypothyroid) cases, while Fein et al have observed occurrence of anemia in 4.2% of women with hypothyroidism.[11] Iron deficiency causes impairment of the heme-dependent enzyme thyroid peroxidase, thereby limiting synthesis of thyroid hormones, which can lead to a reduction in circulating levels of fT3 and fT4. In one study by Baghel et al, prevalence of anemia in women with hypothyroidism was as high as 60% due to iron deficiency.[12] Associated co morbidity of gestational diabetes mellitus was noticed among 7 (16.27%) cases of SCH and 2 (18.18%) cases of OH. Autoimmunity has been implicated to be major cause of thyroid dysfunction associated with diabetes mellitus.[13]

Pre-eclampsia, cardiac failure, and placental abruption

In our study preeclampsia was observed in 7 (16.2%) cases of SCH (sub clinical hypothyroidism) and 2 (18.2%) cases in OH (overt hypothyroid) cases. Placental abruption and cardiac failure were observed in 2 cases (4.65%) and 1 case (2.34%) of SCH only. These results are comparable to study conducted by Manju et al.[14] Hypothyroidism causes increased diastolic pressure, peripheral vascular resistance, and decreased tissue perfusion, which could be the pathophysiology of preeclampsia in hypothyroidism.[15]

Cesarean section, oligohydramnios and preterm labor

Cesarean delivery occurred in 8 cases (18.6%) of SCH and 4 cases (36.36%) of overt hypothyroidism. The reason for the increased risk of cesarean delivery may be due to the associated pregnancy complications, such as hypertensive disorders, gestational diabetes, and preterm birth. Oligohydramnios (AFI <5) was noted in 4 cases of SCH (9.30%) and 2 cases (18.18%) of OH. Preterm delivery before 37 weeks (both spontaneous and induced labor) occurred in 11 (25.58%) cases in SCH and in 3 (27.30%) cases of OH. These complications may not be directly attributed to hypothyroid status, however similar incidence noted by Sreelatha et al. [16]

Fetal outcomes

Birth weight <2500gram was recorded in 7 (16.30%) patients of SCH and 4 (36.36%) cases of OH. Reduced fetal thyroxine causes disruption in the development of the pituitary-thyroid axis, growth hormone secretion, maturation, and cardiovascular homeostasis in utero.[17] For 1-min Apgar score cut off value considered was 5, as an indicator for fetal asphyxia. Out of 43 sub clinical hypothyroid (SCH) women 11 (25.58%) babies had low Apgar whereas among 11 OH babies 2 (18.18%) had low Apgar score. NICU Admission was associated with 14 (32.55%) babies in SCH mothers and 5 (45.45%) mothers in OH category. We also recorded 1 (2.34%) stillbirth and 2 (4.65%) neonatal death among SCH patient's category. In overt hypothyroid, category also had 1 (9.09%) neonatal death in NICU. Similar fetal outcomes were noted by Gupta et al.[18] These outcomes of babies born to mothers with inadequately controlled hypothyroidism at third trimester might improve, if screening of thyroid disorders and treatment started in first trimester itself.[19,20]

Limitation

Small sample size was the main limitation of this study.

CONCLUSION

This study concludes a high prevalence of thyroid disorders as subclinical hypothyroidism (9.6%), overt hypothyroidism (2.45%) and subclinical hyperthyroidism (1.5%) in third trimester pregnancy. Association of previous abortions, anemia, gestational diabetes, preeclampsia, placental abruption, increased cesarean delivery, presence of LBW babies, low Apgar score and increased number of NICU admission are the major finding of this study. Antenatally, it thus becomes important to screen the women's thyroid profile during first ANC visit to give a proper diagnosis and early treatment.

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