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ORIGINAL RESEARCH

The Prevalence of Overt and Subclinical Thyroid Dysfunction among Pregnant Women and Its Effect on Maternal and Fetal Outcomes

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ABSTRACT

Background: Thyroid dysfunction in pregnancy is one of the most prominent endocrinological disorders. Physiological changes in thyroid status and non-adaptation to these changes during pregnancy lead to thyroiddysfunction resulting in feto-maternal complications. **Aim and Objective:** To determine the current prevalence of thyroid dysfunction in normal pregnant women and to study the impact of thyroid dysfunction on maternal and fetal outcomes.**Methods:** This prospective study was conducted enrolling 115 pregnant women with thyroid dysfunction irrespective of their gestational age who came for antenatal check-up. Recent TSH, fT3, and fT4 values were noted, and whether the patient is on treatment or not was noted. The patients who were not on treatment were treated. These cases were followed up till the termination of pregnancy. TFT was repeated every 6-8 weeks or in each trimester, and in cases of deranged TFT, drug dosage was titrated accordingly. At the end, obstetric and perinatal outcomes of the pregnancy were noted. **Results:** Out of 115 subclinical hypothyroid (s.hypo) pregnant women, 15 (25%) of them had preeclampsia (PE), 1 (1.66%) had abruption, 13 (12.5%) had anemia, 3 (5%) of them had abortion, and 1 (1.6%) had PPH. Out of 15 overt (o.hypo) pregnant women, 6 (40%) had PE, 1 (6.7%) of them had abruption, 2 (13.3%) had anemia, 3 (20%) had abortion, and 1 (6.7%) of them had PPH. Out of 25 hypothyroid pregnant women in the (eu.hypo) state, 4 (16%) had PE, 2 (8%) had anemia, 1 (2%) of them had PPH, and none of them had abruption and abortion. Out of 3 subclinical hyperthyroid (s.hyper) pregnant women, 1 (33.3%) had PE. Out of 7 overt hyperthyroid (o.hyper) pregnant women, 4 (57.1%) had PE, and 2 (28.7%) of them had an abortion. Out of 5 hyperthyroid pregnant women in euthyroid (eu.hyper) state, none of them had any complications.**Conclusions:** Maternal thyroid dysfunction is associated with significant adverse effects on maternal and fetal outcomes.Emphasizing the importance of routine antenatal thyroid screening in the first trimester.

Key Words: Thyroid dysfunction, Hypothyroidism, Hyperthyroidism, Pregnancy

INTRODUCTION

Thyroid disorders constitute one of the most common endocrine disorders in pregnancy [1]. Pregnancy is associated with profound modifications in the regulation of thyroid function. These changes are the result of various factors like an increase of thyroxine-binding globulin (TBG) due to elevated estrogen and human chorionic gonadotropin (hCG), increased renal losses of iodine due to increased glomerular filtration rate, modifications in the peripheral metabolism of maternal thyroid hormones, and modification in iodine transfer to the placenta [2]. The physiological changes of pregnancy can simulate thyroid disease. Symptoms of heat intolerance, sluggishness, fatigue, and constipation and examination findings of tachycardia, edema, and wide pulse pressure are common to pregnancy and thyroid disease in much the same way [3].

The prevalence of overt hyperthyroidism complicating pregnancy has been reported to range between 0.4 and

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1.7% [4], and an estimated 2–3% of women are hypothyroid during pregnancy [1, 5]. Overt hyperthyroidism occurs in 0.4–1.7% of pregnant women [6]. Women with thyroid dysfunction, both overt and subclinical, are at increased risk of pregnancy-related complications such as threatened abortion, preeclampsia, preterm labor, placental abruption, and postpartum hemorrhage. Fetal complications include low-birth-weight babies, first-trimester spontaneous abortions, preterm delivery, fetal or neonatal hyperthyroidism, intrauterine growth retardation, high rates of stillbirth and neonatal deaths, neonatal hyperbilirubinemia, higher incidence of neonatal hypothyroidism, and increased perinatal mortality [7]. There is a dearth of studies showing the prevalence of overt and subclinical thyroid dysfunction in pregnant women and its effect on the maternal and fetal outcomes; moreover, the few studies that were conducted were performed in foreign countries.

There is also a concern about the effect of overt maternal thyroid disease and even subclinical maternal thyroid disease on fetal development. Indeed, subclinical hyperthyroidism is not associated with adverse outcomes. In addition, medications that affect the maternal thyroid gland can cross the placenta and affect the fetal thyroid. Women with thyroid dysfunction, both overt and subclinical, are at increased risk of pregnancy-related complications such as threatened abortion, preeclampsia, preterm labor, placental abruption, and postpartum hemorrhage. Fetal complications include low birth weight, IUGR, fetal or neonatal hyperthyroidism and hyperbilirubinemia, stillbirth, and perinatal mortality. The present study has been undertaken to know the obstetric and perinatal outcomes of pregnant women suffering from thyroid dysfunction.

METHODS

Pregnant women with thyroid dysfunction who came for ANC checkups at Prasad Medical College attached to the OBG department, Lucknow, irrespective of gestational age.

Method of collection of data

Sample size: 60, Total number of pregnant women with thyroid dysfunction coming for ANC check-up at Prasad Medical College attached to the OBG department, Lucknow.

INCLUSION CRITERIA: All pregnant women with thyroid disorders who came for ANC checkup With singleton pregnancy

EXCLUSION CRITERIA: Multifetal gestation, medical disorders like diabetes, hypertension

SUBJECTS: Pregnant women with thyroid dysfunction who are coming for ANC checkup at Prashad Medical College attached to the OBG department, Lucknow, after signing the written informed consent for participation, underwent examination as follows:

- Gestational age was estimated on the basis of the last menstrual period and early obstetric scan.
- Detailed history was taken regarding the symptoms and signs of thyroid disorders, menstrual history, obstetric history, past history, medical history, family history, and personal history.
- A detailed examination with reference to pulse rate, BP, temperature, and respiratory rate was noted. Local thyroid examination was done. CVS, CNS, RS, per abdomen, and PV examination were done.
- Recent TSH, fT3, and fT4 values were noted, and whether the patient was on treatment or not was noted.
- Based on the TSH, fT3, and fT4 values, patients were grouped as hypothyroid or hyperthyroid.
- The patients who were not on treatment were treated.For hypothyroid patients, thyroxine was started, and for hyperthyroid patients, methimazole was started (PTU in the first trimester).
- Every 8 weeks, TSH value was estimated and the dose of the drug titrated. At the end, obstetric outcome and the perinatal outcome of the pregnancy were noted. The following outcome variables in relation to thyroid disorders were studied:

Hyperthyroidism in pregnancy:
Maternal outcome variables include:

- Preeclampsia
- Heart failure

Fetal outcome variables include:

- Preterm delivery
- Growth restriction
- Stillbirth

Hypothyroidism in pregnancy:
Maternal outcome variables include:

- Miscarriage
- Anemia in pregnancy
- Pre-eclampsia (PE)
- Abruption placenta
- Postpartum hemorrhage (PPH)

Fetal outcome variables include:

- Premature birth
- Low birth weight
- Increased neonatal respiratory distress.

Preeclampsia was defined as persistently elevated blood pressure (systolic ≥140 mm Hg and diastolic pressure ≥90 mm Hg on more than 2 occasions) with proteinuria. Preterm delivery was defined as delivery before 37 completed weeks of gestation after the period of viability. IUGR was defined as birth weight less than the 10th percentile for gestational age.

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Stillbirth was defined as the birth of a newborn after 28 completed weeks (1000 g or more) when the baby does not breathe or show any sign of life after delivery. Abortion was defined as spontaneous termination of pregnancy before the period of viability. Abruptio placenta was defined as a form of postpartum hemorrhage where the bleeding occurs due to premature separation of a normally situated placenta. Postpartum hemorrhage is defined as the blood loss of 500 ml or more from the genital tract following vaginal delivery or 1000 ml or more following caesarean section. Low birth weight was defined as weight < 2500 g. Anemia in pregnancy was defined as hemoglobin concentration in the peripheral blood ≤ 11 g/100 ml. Neonatal respiratory distress was defined as the presence of any 2 of the following features:

1. Respiratory rate > 60/min.
2. Subcostal/intercostal recessions
3. Expiratory grunt/groaning

STATISTICAL ANALYSIS

The descriptive procedure displays univariate summary statistics for several variables in a single table and calculates standardized values (z-scores). Variables can be ordered by the size of their means (in ascending or descending order), alphabetically, or by the order in which the researcher specifies. The following descriptive statistics were employed in the present study: mean, standard deviation, frequency, and percentages.The statistical methods were carried out through SPSS for Windows (version 24.0).

RESULTS

Out of 115 subclinical hypothyroid (s.hypo) pregnant women, 15 (25%) of them had preeclampsia (PE), 1 (1.66%) had abruption, 13 (12.5%) had anemia, 3 (5%) of them had abortion, and 1 (1.6%) had PPH. Out of 15 overt (o.hypo) pregnant women, 6 (40%) had PE, 1 (6.7%) of them had abruption, 2 (13.3%) had anemia, 3 (20%) had abortion, and 1 (6.7%) of them had PPH. Out of 25 hypothyroid pregnant women in the (eu.hypo) state, 4 (16%) had PE, 2 (8%) had anemia, 1 (2%) of them had PPH, and none of them had abruption and abortion. Out of 3 subclinical hyperthyroid (s.hyper) pregnant women, 1 (33.3%) had PE. Out of 7 overt hyperthyroid (o.hyper) pregnant women, 4 (57.1%) had PE, and 2 (28.7%) of them had an abortion. Out of 5 hyperthyroid pregnant women in euthyroid (eu.hyper) state, none of them had any complications.

Table 1: Maternal complications in the study population

Maternal complications	S.hypo	O. hypo	Eu.hypo	S.hyper	O.hyper	Eu.hyper	P-value
PE	15	6	4	1	4	0	0.032
Abruptly	1	1	0	0	2	0	0.47
Anemia	7	2	2	0	0	0	0.32
Abortion	3	3	0	0	0	0	0.001
PPH	1	1	1	0	0	0	0.68

Among subclinical hypothyroid pregnant women, 54 had live births, 6 were preterm babies, 15 were IUGR babies, 22 babies had respiratory distress, and 2 were IUD. Among overt hypothyroid pregnant women, 16 had live births, 2 were preterm babies, 2 were IUGR babies, 7 babies had respiratory distress, and 1 was IUD. Among hypothyroid pregnant women in a euthyroid state, 32 had live births; none of them had preterm delivery, 4 were IUGR babies, 2 babies had respiratory distress, and 1 was IUD. Among subclinical hyperthyroid pregnant women, 2 had live births, 1 was a preterm baby, and 1 baby had respiratory distress. Among overt hyperthyroid pregnant women, 4 were live births, 1 were preterm babies, 1 were IUGR babies, and 1 baby had respiratory distress. Among hyperthyroid pregnant women in a euthyroid state, 3 were live births, and 1 baby had IUGR.

Table 2: Fetal outcome in the study population

Maternal complications	S.hypo	O. hypo	Eu.hypo	S.hyper	O.hyper	Eu.hyper
Live births	54	16	32	2	4	3
Preterm	6	2	0	1	1	0
IUGR	15	2	4	0	1	1
Respiratory distress	22	7	2	1	1	0
IUD	2	1	1	0	0	0

DISCUSSION

It is best to screen women early in the pregnancy for thyroid dysfunction because thyroid diseases satisfy most of the criteria for a disease to warrant population screening. They are common, treatable, and, to some extent, preventable conditions that produce morbidity and pose special risks for pregnancy and the developing fetus. Screening for thyroid dysfunction in

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a woman who is pregnant or wants to be pregnant is important because thyroid hormone status is directly related to fetal brain development. Prevalence of hypothyroidism was high in our study, with 3% of overt and 9% of subclinical hypothyroid patients, thus necessitating the need for universal screening for thyroid dysfunction.

In our study, it was noted that overt hypothyroid and overt hyperthyroid women had higher maternal ages as compared to women in the other groups. It was seen that increased maternal age was associated with a higher incidence of thyroid dysfunction. The increase in prevalence of hypothyroidism in the older age group is due to the current trend of older women becoming pregnant. There were several important findings from the study. First, preeclampsia was the most common maternal complication in hypothyroid patients, followed by abruption. Second, the occurrence of fetal loss (spontaneous abortion, fetal death) was significantly increased in the pregnant women with overt hypothyroidism. Third, the pregnant women with subclinical and overt hypothyroidism had a significant increase in the incidence of preterm delivery, fetal distress, and intrauterine growth retardation.

The present study was done in Prashad Medical College attached to the OBG department. A total of 115 pregnant women with thyroid dysfunction were included in the study. It was a prospective study. The main aim of the study was to know the impact of maternal thyroid dysfunction on maternal and fetal outcomes. Thyroid disorders are common among pregnant women. Diagnosis of thyroid dysfunction is complicated by non-specific symptoms, the hypermetabolic state of pregnancy, and normal physiological changes associated with the thyroid gland and its function in pregnancy. If untreated, thyroid dysfunction may adversely affect the mother and fetus. In our study, subclinical hypothyroidism was associated with complications like PE (25%), AP (1.66%), anemia (12.5%), AB (5%), PPH (1.6%), preterm (5.2%), IUGR (13%), respiratory distress (19.1%), and IUD (1.73%). In a study done by Ajmani *et al.2,* the incidence of complications in cases of subclinical hypothyroidism was PE (22.3%), anemia (14.1%), abortion (5.5%), PPH (5.5%), PTD (5.8%), IUGR (4.9%), respiratory distress (11.8%), and IUD (1.7%). Incidence of complications associated with subclinical hypothyroidism in our study was comparable to the study conducted by Ajmani *et al.* [8] In a study conducted by Leung *et al. (3),* the incidence of complications in cases of subclinical hypothyroidism were PE (7.6%), PTD (9%), and LBW (9%). In a study done by Sahu MT *et al.,* the complications like PE (9.8%), PTD (10.3%), IUGR (2.4%), and IUD (2.5%) were seen in cases of subclinical hypothyroidism. [9] In these 3 studies, there was no incidence of abruptio placenta. In a study done by Sreelatha *et al.,* the complications like PE (14.7%), anemia (4.2%), abortion (2.1%), PPH (6.3%), and PTD (3.1%) were noted. [10] In our study, the incidence of respiratory distress was higher compared to other studies.

In our study, overt hypothyroidism was associated with complications like PE (40%), AP (6.7%), anemia (13.3%), abortion (20%), PPH (6.7%), PTD (13.3%), IUGR (13.3%), RD (46.7%), and IUD (6.7%). In a study done by Ajmani *et al.*, the complications like PE (16.6%), AP (16.6%), anemia (8.3%), abortion (16.6%), PPH (8.3%), PTD (33.3%), IUGR (25%), RD (25%), and IUD (16.6%) were seen in cases of overt hypothyroidism. In a study done by Leung *et al.,* the incidence of complications in overt hypothyroidism was like PE (22%) and IUD (4%). In a study done by Sahu M T *et al.*

The complications like PE (20.7%), PTD (4.7%), IUGR (13.8%), and IUD (2.9%) were seen in overt hypothyroidism. In a study done by Thanuja *et al., the* incidence of complications like AP (33.4%) and abortion (66.7%) was seen in overt hypothyroidism. [11] In a study done by Ablovich*et al., the* complications like AP (19%) and IUD (3%) were seen in cases of overt hypothyroidism. The incidence of complications varied in different studies, but some studies are comparable. [12] In our study the incidence of PE and respiratory distress was high compared to other studies. In our study, subclinical hyperthyroidism was associated with complications like PE (33.33%), PTD (33.33%), and respiratory distress (33.33%). In a study conducted by Kriplani *et al.,* complications like PE (22%) and PTD (25%) were seen in subclinical hyperthyroidism. [13] In a study done by Thanuja *et al., complications* like PE (50%) and IUGR (25%) were seen in subclinical hyperthyroidism. In a study done by Tuija Mannisto *et al., subclinical* hyperthyroidism was associated with complications like PE (3.5%) and abruptio placenta (1%). [14] In none of the studies was associated with abortion and perinatal mortality. The incidence of RD was higher in our study.

In our study, overt hyperthyroidism was associated with complications like PE (40%), abortion (20%), PTD (13.3%), IUGR (13.3%), and RD (6.7%). In a study done by Kriplani *et al.* complications like PE(22%), PTD(25%) and IUGR(13%) were seen in cases overt hyperthyroidism. In a study done by Thanuja *et al.,* overt hyperthyroidism was associated with PE (33.4%), abortion (50%), and PTD (16.67%). [11] In our study, the incidence of PE was higher compared to other studies. Incidence of abortion was higher in the study conducted by Thanuja *et al*. In all studies, the incidence of PTD was comparable.

CONCLUSION

This study re-emphasizes the need to control thyroid dysfunction during pregnancy by maintaining mothers thyroxine levels in the high normal range. This will avoid complications like abortion, preterm labor, preeclampsia, anemia, low birth weight, etc.

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