

Prevalence of thyroid dysfunction in pregnancy and its implications

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Abstract

Background: Thyroid disorders are one of the most common endocrine disorders in pregnancy. Thyroid disorders are known to be associated with abnormal maternal and fetal outcomes and are often overlooked in pregnant women because of nonspecific symptoms and hypermetabolic state of pregnancy.

Objective: To determine the prevalence of thyroid dysfunction and study its implications in pregnancy in a tertiary-care hospital.

Materials and Methods: Four hundred pregnant women in the first trimester from November 2013 to October 2014 were recruited for the study. Serum thyroid-stimulating hormone (TSH) test was done, apart from the routine blood sample investigations as per FOGSI-ICOG Good Clinical Practise Recommendations. Free T4, free T3, and thyroid peroxidase antibody tests were done in patients with a deranged TSH value. Patients were followed up till delivery, and obstetrical complications arising out of thyroid dysfunction were noted and managed.

Result: The prevalence of hypothyroidism was 7.5% and hyperthyroidism 0.75%. When compared with patients with euthyroidism, preeclampsia and intrauterine growth restriction were the most significant complications observed in patients with hypothyroidism, with the incidence of 33.3% versus 7.3% and 16.6% versus 5.7%, respectively. Incidence of cesarean section was documented to be high in hypothyroidism (39.28% vs. 23.3%), and 36.36% of those were performed to avoid fetal distress.

Conclusion: Prevalence of hypothyroidism was found to be high in our study and was associated with adverse pregnancy outcomes; hence, antenatal thyroid screening should be judiciously offered. Routine testing with serum TSH is a sufficient and cost-effective screening tool.

KEY WORDS: Thyroid dysfunction, miscarriage, anemia, preeclampsia, preterm labor, intrauterine growth retardation

Introduction

Thyroid physiology plays a major role in pregnancy, and thyroid disorders constitute one of the most common endocrine disorders in pregnancy.^[1] Pregnancy is associated

with significant and reversible changes in thyroid function. During pregnancy, there is an enhanced urinary loss of iodine owing to an increased glomerular filtration rate, leading to iodine deficiency and maternal goitre.^[2] There is an increase in thyroxine-binding globulin (TBG) because of elevated oestrogen and decrease in the level of thyroid-stimulating hormone (TSH) with an increase in human chorionic gonadotropin concentration.^[3,4] Placenta produces the enzyme deiodinase, which increases the peripheral metabolism of thyroid hormones and regulates the transplacental transport of thyroid hormone and iodide.^[5,6] In essence, pregnancy is a stress for the thyroid, resulting in hypothyroidism in women with limited thyroidal reserve or iodine deficiency.

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The developing fetus synthesizes thyroid hormones only by the end of the first trimester and, hence, depends on the maternal thyroid hormone for organogenesis, general growth, and development of the central nervous system.^[3,5] Moreover, thyroid hormones are essential for the maintenance and successful completion of normal pregnancy.^[7]

There are two main clinical forms of hypothyroidism. First is subclinical hypothyroidism, which is characterized by an elevated serum TSH with normal free thyroxine (FT4) and is observed in 3%–5% of women in pregnancy. Second is overt hypothyroidism, characterized by an elevated serum TSH and subnormal FT4 is observed in 0.3%–0.5% of women in pregnancy.^[8]

Occurrence of hyperthyroidism is less during pregnancy with the prevalence being 0.1%–0.4%.^[3] Overt hyperthyroidism is seen in nearly 0.002% of pregnancy characterized by a reduced TSH and an increased FT3/FT4. Subclinical hyperthyroidism is seen in 1.7% of pregnancy and is characterized by a suppressed serum TSH and normal FT4.^[9]

Pregnant women with thyroid dysfunctions are at an increased risk of pregnancy-related complications such as spontaneous abortion, anemia, preeclampsia, placental abruption, intrauterine growth restriction (IUGR), and postpartum hemorrhage.^[10] With this background, this study aims to find the prevalence of thyroid dysfunction in pregnancy and its impact on obstetrical outcomes.

Materials and Methods

This is a prospective study conducted on 400 pregnant women attending the Department of Obstetrics and Gynaecology, Malla Reddy Institute of Medical Sciences, Hyderabad, over a period of 1 year from November 2013 to October 2014. All antenatal women in their first trimester, with no other medical disorders, having singleton pregnancy were included in the study. Patients with known thyroid disorder, multiple gestations, and patients with hypertension and diabetes were excluded from the study. After a detailed history and examination, a screening for thyroid disorder was done with serum TSH assay. Those with abnormal TSH were subjected to FT4, FT3, and antithyroid peroxidase (TPO) antibody assay.

The reference range used in the study was based on the guidelines of the American Thyroid Association, 2011, for the diagnosis and management of thyroid disease during pregnancy and postpartum period.^[11] According to the guidelines, if trimester-specific ranges for TSH are not available in the laboratory, the following reference ranges are recommended: first trimester, 0.1–2.5 $\mu\text{IU/mL}$; second trimester, 0.2–3.0 $\mu\text{IU/mL}$; and third trimester, 0.3–3.0 $\mu\text{IU/mL}$.

Patients with dysthyroidism were diagnosed as hypothyroid or hyperthyroid according to their thyroid profile and treated accordingly with L-thyroxine or propyl thiouracil. Thyroid function test was repeated every 6 weeks, and drug doses were adjusted accordingly. Patients with euthyroidism were taken as control. All the cases were followed

Table 1: Demographic feature of study population

	Number of cases, N = 400	Euthyroid, N = 367 (%)	Hypothyroid, N = 30 (%)	Hyperthyroid, N = 3 (%)
Gravida				
G1	194	177 (91.2)	15 (7.7)	2 (1.03)
G2	131	120 (90.8)	10 (7.6)	1 (0.07)
G \geq 3	75	70 (93.3)	5 (6.6)	0
Mean age	23.15 \pm 3.52	23.04 \pm 3.34	24.83 \pm 4.10	20.66 \pm 1.52
Mean BMI	21.32 \pm 2.37	21.16 \pm 2.24	23.46 \pm 2.87	20 \pm 2.64

up throughout the pregnancy, and pregnancy outcomes were noted in terms of abortion, anemia, pregnancy-induced hypertension, IUGR, preterm labor, incidence of lower segment cesarean section (LSCS) for fetal distress, and primary postpartum hemorrhage (PPH).

Statistical Analysis

Statistical testing was conducted with the Statistical Package for the Social Science System (SPSS). Continuous variables are presented as mean \pm SD, and categorical variables are presented as absolute numbers and percentage.

Nominal categorical data between the groups were compared using χ^2 goodness-to-fit test. The α level was set as p value less than 0.05.

Result

Of the 400 cases, 33 cases were diagnosed as having deranged thyroid profile, making the prevalence of thyroid dysfunction during pregnancy as 8.25%. Prevalence of hypothyroidism was 7.5% ($n = 30$), of which 6% ($n = 24$) showed subclinical hypothyroidism and 1.5% ($n = 6$) overt hypothyroidism. In our study, prevalence of hyperthyroidism was 0.75% ($n = 3$), and all were subclinical. Anti-TPO antibody was found positive in 36.6% ($n = 11$) of patients with hypothyroidism. No anti-TPO antibody was found in patients with hyperthyroidism.

Demographic Feature of Study Population

As shown in Table 1, most of the cases were primigravida; however, there was no statistically significant association between gravida and thyroid dysfunction. In our study, mean maternal age was 23.04 \pm 3.34 years for patients with euthyroidism, 24.83 \pm 4.10 years for patients with hypothyroidism, and 20.66 \pm 1.52 years for patients with hyperthyroidism. Mean BMI was 21.16 \pm 2.24 for patients with euthyroidism, 23.46 \pm 2.87 for patients with hypothyroidism, and 20 \pm 2.64 for patients with hyperthyroidism.

In our study, most of the hypothyroid cases were managed with L-thyroxine (50–100 μg per day); however, two of the overt hypothyroid cases with initial TSH level > 100 $\mu\text{IU/mL}$ required 150 μg per day of L-thyroxine to control the condition.

Table 2 shows the occurrence of maternal complications in different groups of patients. When compared with euthyroid

Table 2: Pregnancy complications in different group of patients

Pregnancy complications	Euthyroid, N = 367 (%)	Hypothyroid, N = 30 (%)	p	Hyperthyroid, N = 3 (%)
Miscarriage	12 (3.2)	2 (6.66)	0.294	1 (33.3)
Anemia	34 (9.2)	3 (10)	0.840	0
Preeclampsia	27 (7.3)	10 (33.33)	<0.0001	0
Preterm labor	17 (4.6)	1 (3.33)	0.734	0
IUGR	21 (5.7)	5 (16.66)	0.009	0
GDM	18 (4.9)	2 (6.66)	0.653	0
Still birth	2 (0.05)	0	0.688	0
PPH	19 (5.1)	1 (3.33)	0.646	0

Table 3: Mode of delivery in different groups

Mode of delivery	Euthyroid, N = 355 (%)	Hypothyroid, N = 28 (%)	p	Hyperthyroid, N = 2 (%)
NVD	267 (75.2)	16 (57.14)	0.027	2 (100)
Instrumental delivery	5 (1.4)	1 (3.57)	0.325	0
LSCS	83 (23.3)	11 (39.28)	0.046	0
LSCS for fetal distress	12 (14.4)	4 (36.36)	0.0002	0

cases, hypothyroidism was significantly associated with preeclampsia (33.3% vs. 7.3%; $p = 0.0001$) and IUGR (16.6% vs. 5.7%; $p = 0.009$). No significant increase in miscarriage (3.2% vs. 6.66%), anemia (9.2% vs. 10%), gestational diabetes (4.9% vs. 3.33%), preterm labor (4.6% vs. 3.33%), still birth (0.05% vs. 0%) and PPH (5% vs 3.31%) was noted in patients with hypothyroidism. The data on hyperthyroidism were inconclusive as the sample size was small.

Table 3 shows the route of delivery in different groups. Of the 355 patients with euthyroidism, 272 (76.6%) patients had a vaginal delivery [75.2% normal vaginal delivery (NVD); 1.4% instrumental delivery], and 83 (23.3%) patients had a cesarean section. Of the 28 patients in the hypothyroid group, 17 (60.7%) patients had a vaginal delivery (57.14% NVD; 3.57% instrumental delivery), and 11 (39.28%) patients had a cesarean section. NVD was significantly low in the hypothyroid group (57.1% vs. 75.2%; $p = 0.027$). The rate of cesarean section was high in cases with hypothyroidism when compared with controls with euthyroidism (39.28% vs. 23.3%, $p = 0.046$).

Among the various indications of cesarean section, cesarean section for fetal distress was significantly high in hypothyroid cases (36.36% vs. 14.4%, $p = 0.0002$).

In the hyperthyroid group of three patients, one had a spontaneous abortion at 11 weeks. Other two patients had an uneventful pregnancy and NVD at term.

Discussion

Thyroid disorders are one of the most common endocrine disorders in women during pregnancy and are associated with adverse maternal and foetal outcomes in pregnancy. However, an early detection of thyroid dysfunctions and treatment of mother during gestation improves the outcome.^[4]

Early detection of thyroid during pregnancy is possible if the patient is suggested thyroid function test during her first prenatal visit or soon after the pregnancy is confirmed.^[2]

The prevalence of hypothyroidism was found to be high in our study, at 7.5%, thus, necessitating the need of universal screening of thyroid dysfunction. A study done by Sahu et al.,^[12] in 2009, reported the incidence of subclinical and overt hypothyroidism in India as 6.5% and 4.6%, respectively. However, the prevalence of subclinical hypothyroidism in northern and southern parts of India was separately reported as 6.47% and 2.8%, respectively, in another study.^[13]

In our study, preeclampsia and IUGR were the most common pregnancy complications in patients with hypothyroidism. NVD was less common and the occurrence of cesarean section was also high in patients with hypothyroidism when compared with patients with euthyroidism. In addition, hypothyroidism increased the risk of fetal distress, which is in agreement with the study done by Goel et al., in 2005.^[14] Their study reported a higher incidence of fetal distress in pregnancies complicated by maternal hypothyroidism. It has been suggested that hypothyroidism may exert irreversible effects on the fetus and placenta in early pregnancy, which impair their ability to tolerate the stress of a normal delivery, thereby increasing the incidence of fetal distress in labor.

In our study, the incidences of abortion, anemia, preterm labor, gestational diabetes, and PPH were almost the same in the cases of hypothyroidism and euthyroidism, which could probably be the result of an early detection and a good thyroid control with medications.

Although hyperthyroidism in pregnancy is uncommon, its effects on both mother and child are critical. In our study, no significant conclusion could be drawn as the sample size was small.

Conclusion

Thyroid dysfunction in pregnancy is associated with adverse pregnancy outcomes; hence, antenatal thyroid screening should be judiciously offered. Prompt detection and corrective treatment with thyroxine can prevent many obstetrical complications and result in the delivery of a healthy baby. Therefore, routine testing with serum TSH is a sufficient and cost-effective screening tool.

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