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Original Research Article

Fetomaternal outcome of newly detected thyroid disorders among pregnant women in tertiary care hospital: a cross sectional study

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ABSTRACT

Background: Thyroid hormones are vital for fetal development and maternal health. Both overt and subclinical thyroid disorders can lead to complications like miscarriage, preterm labor, and neonatal issues. Identifying newly detected thyroid disorders in pregnancy is crucial for improving outcomes for both mothers and babies.
Methods: This cross-sectional study evaluated pregnant women newly diagnosed with thyroid disorders at a tertiary care hospital. Data on thyroid function, pregnancy complications, and neonatal health were collected and analyzed to assess the impact of these disorders. The findings aimed to enhance diagnostic methods and patient care.
Results: In our study, out of 150 cases, 148 were subclinical hypothyroidism, and 2 were subclinical hyperthyroidism. Subclinical hypothyroidism in pregnancy was associated with PPH (0.7%), preeclampsia (21.3%), preterm labor (9.3%), GDM (6.7%), IUD (3.3%), neonatal death (2.7%), prematurity (12.7%), LBW (21.3%), NICU admission (28%), congenital anomalies (2%), and neonatal hypothyroidism (11.3%). These findings were consistent with other studies; however, the number of hyperthyroid cases in our study was insufficient for a thorough outcome analysis.
Conclusions: Thyroid disorders during pregnancy can negatively impact both maternal and fetal outcomes, underscoring the need for routine antenatal thyroid screening.

Keywords: Hypothyroidism, Hyperthyroidism, Pregnancy complications, Neonatal outcome

INTRODUCTION

Thyroid hormones play a crucial role in the development of both the fetus and the placenta, as well as in maintaining the mother's overall health during pregnancy. Both overt hypothyroidism and hyperthyroidism have been strongly associated with various adverse pregnancy and neonatal outcomes. It is now widely recognized that even subclinical thyroid dysfunction, which might not present obvious symptoms, can have significant negative effects on pregnancy and fetal development.[1]

Adverse pregnancy outcomes linked to thyroid dysfunction include miscarriage, hypertensive disorders such as preeclampsia, gestational diabetes mellitus, antepartum hemorrhage, intrauterine fetal demise, postpartum hemorrhage, preterm labor, and an increased risk of fetal morbidity and mortality. These obstetric complications, in turn, contribute to a higher frequency of adverse neonatal outcomes, such as prematurity, low birth weight, neonatal jaundice (hyperbilirubinemia), and thyroid dysfunction in newborns, including neonatal hypothyroidism or hyperthyroidism.[2]

Hyperthyroidism in pregnancy is less common than hypothyroidism. If left untreated, it can lead to complications for both the mother and fetus. Neonatal Graves' disease may occur in approximately 1-5% of newborns due to the transfer of TRAb from the mother to the fetus.[3]

Moreover, thyroid hormones are essential for proper brain development in the fetus. Infants born with congenital hypothyroidism face severe cognitive, neurological, and developmental challenges if left untreated. Research has also shown that children born to mothers with hypothyroidism during pregnancy tend to have lower intelligence quotient (IQ) scores compared to children whose mothers had normal thyroid function during pregnancy, highlighting the long-term impact of maternal thyroid health on child development.[4]

METHODS

This study was Cross sectional study conducted at Hassan Institute of Medical Sciences, Hassan, Karnataka for 6 months from April 2024 to September 2024.

Inclusion criteria

All pregnant women who was newly diagnosed with thyroid disorder in less than 20weeks of gestation, all pregnant women who came for regular antenatal checkup at HIMS, Hassan were included.

Exclusion criteria

Known case of thyroid disorder, multifetal pregnancy, bad obstetric history, patient who are hemodynamically unstable and who is in acute emergency in pregnancy and needing ICU care were excluded.

Data were collected from pregnant women admitted to Sri Chamarajendra Hospital, HIMS, Hassan, on an inpatient basis from April 2024 to September 2024. Pregnant women who met the inclusion criteria were informed about the study objectives in their native language, and informed consent was obtained. TSH was performed as a screening test using the chemiluminescence method. The cutoff values for TSH were based on the American Thyroid Association guidelines: 1st trimester: 0.1-2.5 µIU/L, 2nd trimester: 0.2-3.0 µIU/L, and 3rd trimester: 0.3-3.0 µIU/L. The reference ranges for T3, T4, and TSH were taken as free T3 (1.71-3.71 pg/mL), free T4 (0.70-1.48 ng/dL), and TSH (0.40-4.0 µIU/L).

Those with abnormal tests were categorized as subclinical hypothyroidism (normal FT4 with high TSH), overt hypothyroidism (low FT4 with high TSH), and hyperthyroidism (high T4 with low TSH). Patients were started on medication and thyroid function tests were repeated every 6-8 weeks during pregnancy, with drug dosages titrated accordingly. Patients were followed throughout pregnancy and were admitted when they developed complications and their fetomaternal outcome was analysed

Maternal outcomes were assessed by evaluating miscarriage, preeclampsia, gestational diabetes mellitus, antepartum hemorrhage, intrauterine fetal demise, postpartum hemorrhage, and preterm labor. Fetal outcomes were assessed by evaluating prematurity, low birth weight, congenital malformations, hyperbilirubinemia, neonatal hypothyroidism or hyperthyroidism, neonatal goiter, neonatal jaundice, NICU admission, and neonatal death. Neonates were screened for thyroid disorders and followed up for a period of three months.

Statistical analysis

The estimation of the sample size for this study was determined using the formula:

$N = Z^2pq/d^2$

Where; Z= 1.96, p= 11, q=89, d=5%(error)

$N = (1.96)^2*11*89/(5)^2$

Based on this calculation, the required sample size was determined to be 147. At the Hassan Institute of Medical Sciences, an average of 6,000 deliveries occurred annually, with cases referred from neighboring cities such as Chikmagalur, Sakleshpur, Holenarasipura, and Arsikere. All pregnant women meeting the inclusion criteria were considered for participation. The study assumed an 11% prevalence of subclinical hypothyroidism, as referenced from previous studies. Taking into account the expected proportion, a 5% absolute precision, and a 95% confidence level, the estimated sample size was calculated as 147. To ensure adequacy, a total of 150 participants were recruited.

RESULTS

The present study was done in HIMS, Hassan. A total of 150 patients with newly detected thyroid disorders were enrolled for the study and started on treatment and TSH was repeated every 6-8weeks and followed up till delivery and outcomes were recorded.

Table 1 shows most participants are aged between 21 to 34 years (127 out of 150 cases), followed by 20 years and below (15 cases), and 35 years and above (8 cases). This suggests that thyroid disorders in pregnancy are more commonly observed in the younger reproductive age group.

Table 2 shows the distribution is almost evenly split between primigravida (first-time mothers) at 76 cases, and multigravida (multiple pregnancies) at 74 cases. This indicates that thyroid disorders affect both first-time and experienced mothers almost equally.

Table 1: Demographic profile.

Age distribution	No. of cases (n=150)	Percentage (%)
20 years and below	15	1
21 to 34 years	127	84.6
35 years and above	8	5.3

Table 2: Parity.

Parity	No. of cases	Percentage (%)
Primigravida	76	50.6
Multigravida	74	49.3

Table 3 shows only 2 cases had maternal complications, 1 with atonic and traumatic postpartum hemorrhage (PPH), and another with PPH with antepartum eclampsia. The remaining 148 cases had no complications. This shows a generally favorable maternal outcome, though rare complications like PPH and eclampsia occurred.

Table 3: Maternal complications.

Complications	No. of cases	Percentage (%)
Nil	148	98.6
Atonic and traumatic PPH	1	0.6
PPH with antepartum eclampsia	1	0.6

In Table 4, there were 4 cases of neonatal death, with 146 cases having no such outcome. Although rare (2.7%), neonatal death is a severe outcome in pregnancies with thyroid disorders.

Table 4: Neonatal complications.

Neonatal complications	No. of cases	Percentage (%)
Neonatal death		
Nil	146	97.3
Present	4	2.6
Prematurity		
Nil	131	87.3
Present	19	12.6
Low birth weight		
Nil	118	78.6
Present	32	21.3
NICU admission		
Nil	108	72
Present	42	28
Congenital anomalies		
Nil	147	98
Present	3	2

Table 4 shows 19 cases experienced prematurity, while 131 cases did not. This results in a prematurity rate of 12.7%, which is higher than typical populations, suggesting a possible association between thyroid disorders and premature births.

In Table 4, 32 cases had low birth weight infants, representing 21.3% of cases. The prevalence of low birth weight is significant and aligns with the risks of thyroid disorders during pregnancy.

In Table 4, 42 cases required NICU admission, while 108 cases did not. A relatively high NICU admission rate (28%) indicates that thyroid disorders in pregnancy may lead to neonatal complications requiring intensive care.

Table 4 shows only 3 cases of congenital anomalies were reported, with 147 cases showing no anomalies. This suggests that the risk of congenital anomalies is low but present in pregnancies complicated by thyroid disorders.

Table 5 shows neonatal hypothyroidism was detected in 17 cases, and 2 cases had physiological jaundice, while 131 cases were normal. The detection of neonatal hypothyroidism in 11.3% of cases indicates the importance of screening neonates born to mothers with thyroid disorders.

Table 5: Neonatal screening.

Neonatal screening	No. of cases	Percentage (%)
Nil	131	87.3
Physiological jaundice	2	1.3
Neonatal hypothyroidism	17	11.3

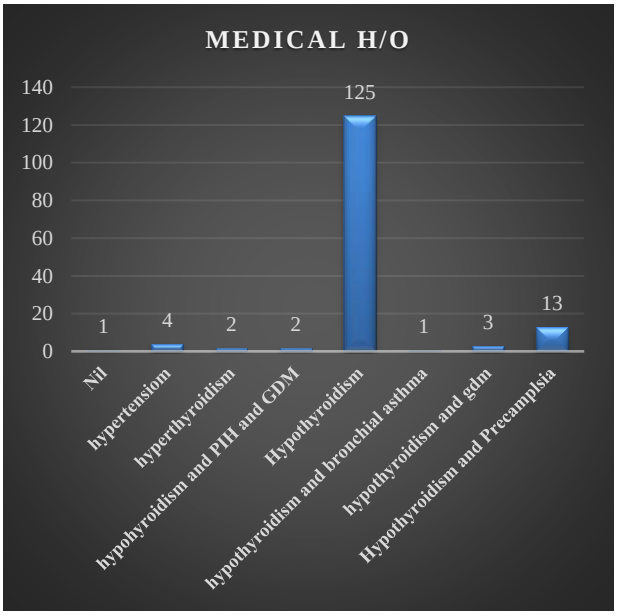

Figure 1: Medical disorders associated with thyroid disorders.

Figure 1 depicts the high prevalence of hypothyroidism among associated medical disorders.

Figure 2 presents the mode of delivery, emphasizing a higher rate of cesarean sections. Out of 150 cases, 61 resulted in cesarean delivery, while 71 had full-term normal delivery (FTND). There were also 8 cases of abortion, and 1 case each of VBAC (vaginal birth after cesarean), IUD (intrauterine death), and PTVD (preterm vaginal delivery). The higher incidence of cesarean sections (40.7%) might reflect complications associated with thyroid disorders during pregnancy.

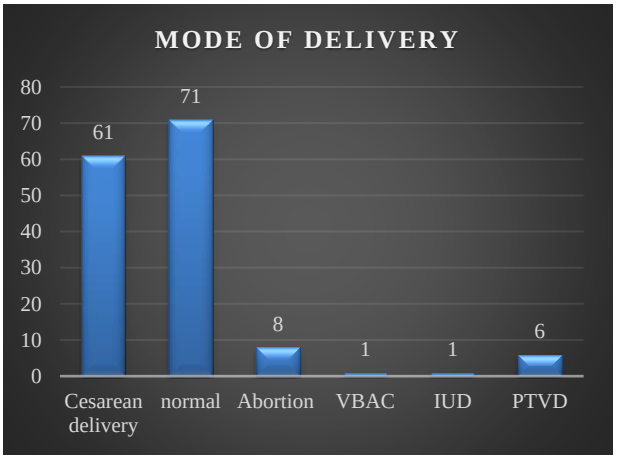

Figure 2: Mode of delivery.

These results suggest that thyroid disorders during pregnancy are associated with increased rates of cesarean sections, low birth weight, NICU admissions, and prematurity, though maternal complications are relatively rare. Neonatal outcomes such as hypothyroidism emphasize the importance of proper screening and management in pregnancies complicated by thyroid disorders.

DISCUSSION

In this study, the fetomaternal outcomes among pregnant women with newly detected thyroid disorders were compared with those reported in Devi et al. The incidence of preeclampsia in this study was 8.7%, which is lower than the 14.7% reported in Devi et al. This difference could be due to variations in the population, clinical management, or early interventions for thyroid disorders.[2]

Similarly, gestational diabetes mellitus (GDM) was observed in 2% of the study population, which is lower than the 4.2% reported in Devi et al. Improved monitoring or differences in diagnostic criteria may explain this variation. However, preterm labor was slightly higher in this study at 4%, compared to 3.1% in Devi et al. The slightly elevated rate of preterm labor might reflect differing obstetric practices or population characteristics.[2]

In terms of neonatal outcomes, low birth weight was reported in 21.3% of cases, which is very close to the 21.9% observed in Devi et al, indicating a similar impact of thyroid disorders on fetal growth across both studies. The comparison suggests that while certain outcomes like preeclampsia and GDM are lower in this study, preterm labor remains slightly elevated, and low birth weight outcomes are consistent with existing literature.[2]

In comparing the outcomes of this study with those of Roy et al, notable differences emerge. The incidence of preeclampsia was higher in this study at 21.3%, compared to 15.8% in Roy et al, suggesting a greater impact of thyroid disorders on hypertensive disorders in pregnancy within this cohort. The cesarean section rate was also significantly higher at 40.7% in this study, compared to 26.3% in Roy et al, indicating a possible increase in obstetric interventions. Prematurity was recorded at 12.7%, more than double the rate of 5.3% seen in Roy et al, highlighting a greater risk of preterm birth associated with thyroid dysfunction in this population.[4]

Conversely, the incidence of low birth weight was lower in this study (21.3%) compared to 31.6% in Roy et al, suggesting that while prematurity rates were higher, the impact on fetal growth may be less severe. Additionally, the rate of NICU admissions was lower in this study at 28%, compared to 42.1% in Roy et al, which may reflect differences in neonatal care practices or the severity of neonatal complications. These findings point to the varying effects of thyroid disorders on pregnancy outcomes, emphasizing the need for tailored management strategies.[4]

Thyroid disease is common in women of reproductive age and is the second most prevalent endocrine disorder after diabetes, with subclinical hypothyroidism being the most widespread. Maternal thyroid deficiency, even when subclinical, has been linked to poor pregnancy outcomes, though T4 replacement therapy may help improve these outcomes. The changes in T4 metabolism during pregnancy make it difficult to maintain consistent thyroid hormone levels in women with hypothyroidism. Pregnancy also increases thyroid gland vascularity, renal iodide clearance, and iodide transfer to the fetus. These fluctuations in thyroxine metabolism during pregnancy may further hinder the maternal-fetal transfer of thyroxine, despite seemingly optimal thyroid function.[7]

In this study, several outcomes related to pregnancy and neonatal health were compared with those reported in Fang et al study. The incidence of abortion in this study was 1.3%, closely aligning with the 1.5% reported in Fang et al, suggesting similar rates of miscarriage between the two populations. However, neonatal death in this study was significantly higher at 2.7%, compared to just 0.1% in Fang et al. This disparity could be influenced by differences in healthcare infrastructure, neonatal care practices, or other risk factors associated with thyroid disorders in pregnancy.[8]

Prematurity was observed at a rate of 12.7% in this study, markedly higher than the 3.4% reported in Fang et al. This suggests that thyroid disorders might have a stronger

impact on preterm births in this cohort, potentially due to delayed diagnosis or differing management strategies. Additionally, the incidence of low birth weight was 21.3% in this study, in stark contrast to the 1.5% reported in Fang et al. The significantly higher rate of low birth weight could reflect a greater impact of thyroid dysfunction on fetal growth and development in this population.[8]

The large discrepancies in neonatal death, prematurity, and low birth weight warrant further investigation to identify the underlying factors and possible interventions to improve maternal and neonatal outcomes in pregnant women with thyroid disorders.

This study has few limitations. With only 150 participants, the study may lack the statistical power to generalize findings to larger populations, especially for rarer outcomes like hyperthyroidism or congenital anomalies. The data were collected from a single tertiary care hospital, which might not represent the broader population with varying socio-economic and healthcare access conditions. Neonatal follow-up was conducted for only three months, which may not capture long-term developmental outcomes or thyroid-related complications in infants.

CONCLUSION

This study highlights the impact of newly detected thyroid disorders in pregnancy, particularly subclinical hypothyroidism, on maternal and neonatal outcomes. It identifies associations with complications like preeclampsia, preterm labor, and low birth weight, emphasizing the need for early screening and management to improve neonatal outcomes.

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