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Research Article

Prevalence And Foetal Outcomes of Thyroid Dysfunction and Anaemia in Pregnancy: A Retrospective Evaluation

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ABSTRACT

Background: Thyroid dysfunction is one of the most common endocrine disorders during pregnancy, second only to diabetes, and can significantly impact maternal and foetal outcomes. Anaemia, another prevalent condition in pregnancy, is associated with adverse maternal and neonatal complications. This study aimed to assess the prevalence of thyroid dysfunction and anaemia among pregnant women and their association with foetal outcomes.
Methods: A retrospective, record-based observational study was conducted at an Urban Health Training Centre. Data from 352 pregnant women aged 18-45 years were analyzed, including thyroid function tests (TSH, Free T3, Free T4), haemoglobin levels, and pregnancy outcomes. Statistical analyses were performed to determine associations between thyroid dysfunction, anaemia, and foetal outcomes such as birth weight, preterm birth, and delivery mode.
Results: Among the study population, 95.45% were euthyroid, while 3.13% had hypothyroidism and 1.42% had hyperthyroidism. Anaemia was present in 54.55% of the women, with moderate anaemia being the most common (26.42%). Low birth weight (LBW) was observed in 15.06% of newborns. No statistically significant association was found between thyroid dysfunction or anaemia and LBW ($p > 0.05$). However, thyroid dysfunction was linked to a higher incidence of caesarean section and preterm birth.
Conclusion: While thyroid dysfunction and anaemia were prevalent among pregnant women, their direct association with LBW was not statistically significant. However, given their potential impact on maternal and foetal health, routine screening for thyroid disorders and anaemia during pregnancy is recommended to ensure early diagnosis and timely intervention.

Keywords*: Thyroid dysfunction, Anaemia, Pregnancy, Foetal outcomes, Low birth weight.*

INTRODUCTION

Thyroid dysfunction is the second most frequent endocrine condition during pregnancy, following diabetes. Recently, it has become the most sought-after research field in clinical endocrinology. Thyroid function assessment during pregnancy is important due to its impact on foetal and mother outcomes. Thyroid physiology changes during pregnancy and can be reversed after birth. High thyroxine-binding globulin (TBG), renal iodine loss, changed thyroid hormone metabolism, and altered iodine transport to the placenta are all contributing causes. These alterations enable the maternal thyroid gland to handle greater physiological demands[1].

During pregnancy, thyroxin (T4) and triiodothyronine (T3) synthesis increases by up to 50%, increasing a woman's daily iodine requirement & TSH levels fall, particularly in the first trimester[2]. Since Human Chorionic Gonadotrophin (HCG) is thyrotrophic, high levels during the first trimester lead to lower TSH levels, resulting in lower cut-offs. Pregnancy stress can cause overt disease in women with insufficient thyroid reserves[2]. Adverse pregnancy outcomes due to thyroid dysfunction include miscarriage, pregnancy-induced hypertension (pre-eclampsia), placental abruption, anaemia, post-partum haemorrhage, and increased foetal morbidity and mortality[3].

Pregnant women often have hypothyroidism, but detection rates in developing countries like India have not kept level with the problem's occurrence [2]. The prevalence of overt and subclinical hypothyroidism during pregnancy in India ranges from 3 to 4.58% and 6.47 to 9%, respectively.5, 6 About 0.4% to 1.7% of pregnancies are complicated by overt hyperthyroidism, and 0.4% to 0.7% by subclinical hyperthyroidism[1]. Early identification and treatment of hypothyroidism might mitigate the burden of poor foetal and mother outcomes during pregnancy[2].

Pregnancy-related hyperthyroidism is less frequent than hypothyroidism. About 1-5% of neonates may have neonatal Graves' illness, which is caused by the mother's TRAb being transferred to the foetus [3].

Anaemia is a significant global public health issue that disproportionately affects young children, menstrual adolescent girls and women, and pregnant and postpartum women. According to the World Health Organisation, 37% of pregnant women are anaemic globally[4]. Anaemia has been classified according to WHO guidelines, with a haemoglobin concentration of <11 g/dl indicating anaemia. HB concentrations of 10-10.9 g/dl, 7-9.9 g/dl, and <7 g/dl were classified as mild, moderate, and severe anaemia, respectively[5].

During pregnancy, red cell mass increases by 30% and plasma volume increases by 40 to 50%, resulting in a drop in haemoglobin concentration of 2gm/dl . This is called physiological anaemia of pregnancy. In 1998, the CDC defined anaemia in iron-supplemented pregnant women as a cutoff of 11g/dl in the first and third trimesters and 10.5g/dl in the second trimester[5] Iron deficiency anaemia during pregnancy can lead to preterm birth, low birth weight, and small-for-gestational-age babies, as well as an increased risk of postpartum haemorrhage. This explains why the prevalence of PPH is higher in India than globally[6].

METHODOLOGY

This retrospective, record-based observational study was conducted in Urban Health Training Centre with access to comprehensive medical records. The study aimed to review records from the past 2 years to assess the prevalence and impact of thyroid dysfunction and anaemia during pregnancy on foetal outcomes. The target population included pregnant women of age group 18-45 years with documented thyroid function tests (TSH, Free T3, Free T4) and haemoglobin levels, as well as complete antenatal and delivery records. Purposive sampling was employed to select all eligible singleton pregnancies with documented gestational age at testing. Records with incomplete data, multiple pregnancies, chronic diseases, or high-risk pregnancies unrelated to the study's focus were excluded.

Data were extracted from ANC (antenatal care) registers, and delivery records using a standardized data extraction form. Based on the records total 352 pregnant women were enrolled in the study. Maternal data included age, parity, BMI, gestational age at testing, TSH levels, Free T3, Free T4, haemoglobin levels, and anaemia classification (mild, moderate, or severe). Foetal data included gestational age at delivery, birth weight, Apgar scores, neonatal thyroid function (if available), and complications such as preterm birth or intrauterine growth restriction (IUGR). Pregnancy outcomes, including the mode of delivery (normal or C-section) and maternal complications such as preeclampsia or gestational diabetes, were also recorded.

Descriptive analysis was performed to calculate the prevalence of thyroid dysfunction, anaemia, and adverse pregnancy outcomes. Inferential analysis examined the relationships between maternal thyroid or haemoglobin levels and foetal outcomes using correlation analysis. Comparative analyses were conducted to compare outcomes in women with normal versus abnormal thyroid or haemoglobin levels, using t-tests and chi-square tests. Regression models were applied to identify predictors of adverse foetal outcomes.

Ethical approval was obtained from the Institutional Ethics Committee, and strict measures were implemented to anonymize patient identifiers and ensure confidentiality. Aggregated data were used for analysis and reporting to protect privacy. The study was conducted over a 6–12 month period, with 3–6 months allocated for data extraction, 2–3 months for data cleaning and statistical analysis, and 1–2 months for report writing. The study established prevalence rates, identified correlations between maternal thyroid dysfunction or anaemia and foetal outcomes, and provided recommendations for early screening and management to improve maternal and foetal health.

RESULT

The average age of pregnant women was 26.60 ± 4.29 years (range 18-42).

Table 1:Distribution of Age ,Gravida and Parity

Age group (Years)	**Frequency(n)**
18-19	6(1.7%)
20-35	331(94%)
35-45	15(4.2%)
Total	352
Gravida	**Frequency(n)**

Primigravida	94(26.7%)
G2	135(38.35%)
G3	94(26.7%)
G4 or higher	29(8.24%)
Total	352
Parity	**Frequency (n)**
P1	161(45.5%)
P2	77(22.3%)
P3	60(16.9%)
P4 or higher	54(15.3%)
Total	352

Table 1 presents the age distribution of the 354 pregnant women included in the study. The majority of the participants (94%) were between the ages of 20 and 35 years, with a total of 331 women falling within this age range. This indicates that most of the women in the study were in their prime reproductive years, while 15 women (4.2%) were aged 35 or older. Additionally, 6 women (1.7%) were aged 19 or younger, representing the youngest age category in the study. The gravida status of the pregnant women. Primigravida women comprised 94 women (26.7%) of the study sample, indicating a substantial proportion of women in their first pregnancy. The remaining women were multigravida, with 135 women (38.1%) having gravida G2, and 94 women (26.7%) had gravida G3. A smaller number of women, 29 women (8.24%), belong to G4 or higher gravida. The parity status, which refers to the number of live births a woman has had. The majority of the women, 161 women (45.5%), had a parity score of one (P1), meaning they had one live birth. 77 women (21.8%) had a parity of two (P2), and 60 women (16.9%) had a parity of three (P3). A smaller proportion of women, 54 women (15.3%), had a parity of four or more (P4).

Table 2: Frequency and Percentage Distribution of Thyroid Disorders, Anaemia, and Foetal Birth Weight

Clinical Parameters	Classification	Frequency	Percentage
Thyroid Dysfunction	Normal	336	95.45%
	Hyperthyroid	5	1.42%
	Hypothyroid	11	3.13%
Anaemia	Normal	160	45.45%
	Mild Anaemia	90	25.57%
	Moderate Anaemia	93	26.42%
	Severe Anaemia	9	2.56%
Foetal Weight	Normal	299	84.94%
	LBW	53	15.06%

Table 2 presents Frequency and Percentage Distribution of Thyroid Disorders, Anaemia, and Foetal Birth weight. The 95.45% of participants were euthyroid, while 3.13% had hypothyroidism and 1.42% had hyperthyroidism. 45.45% of participants had normal haemoglobin levels, while anaemia was observed in 54.55% of the population. Among anaemic individuals, 25.57% had mild anaemia, 26.42% had moderate anaemia, and 2.56% had severe anaemia. 84.94% of newborns had a normal birth weight, while 15.06% were classified as having low birth weight (LBW).

Table 3: Association Between foetal outcome and Thyroid dysfunction & Anaemia in mother

Clinical Parameter	Classification	Foetal Birth Weight		chi square	p-value
		Normal	LBW		
Anaemia	Normal	140	20	1.5	p=0.2207
	Anaemia	159	33		
Thyroid Dysfunction	Normal	287	49	1.437	p=0.2306
	Hyperthyroid	4	1		
	Hypothyroid	8	3		

Among normal mothers, 140 had normal birth weight babies, while **20** had LBW babies. In anaemic mothers, 159 had normal birth weight infants, whereas 33 had LBW infants. The Chi-square value is 1.5, with a p-value of 0.2207, indicating no statistically significant association between anaemia and low birth weight ($p > 0.05$). Among euthyroid mothers, 287 had normal birth weight infants, while 49 had LBW infants. In hyperthyroid mothers, 4 had normal birth weight infants, and 1 had an LBW baby. Among hypothyroid mothers, 8 had normal birth weight infants, while 3 had LBW infants. The

Chi-square value is 1.437, with a p-value of 0.2306, suggesting no statistically significant association between thyroid dysfunction and LBW ($p > 0.05$).

DISCUSSION

Pregnancy influences thyroid function and heme metabolism. Thyroid dysfunction and anaemia are both recoverable disorders. Pregnant women should therefore be screened. This record-based research of 352 pregnant women was undertaken at a UHTC affiliated with a medical college. Thyroid dysfunction has received little attention in this part of India.

The mean age of pregnant women in our study was 26.60 ± 4.29 years. The majority of them were between the ages of 20 and 35 (94%), with 4.2 percent being 35 or older and 1.7% being 19 or younger. Ninety-five ladies (26.8%) were newly pregnant. The rest were multigravida, with the majority being G2 (38.35%), followed by G3 (26.7%). The majority (45.5%) of the women had a para score of one (P1), with P2 accounting for 22.3%. In others, it was P3 or greater. Similarly, Dave et al. [20]observed that the average age of women in their study was 24.46 years. 55.08% of the women were nullipara, 31.14% were primipara, 11.47% were para 2, and 2.2% were para 3 or higher.

In our study, sixteen women (4.55%) had a history of thyroid disorders. Dave et al [20] showed that a greater number of women (4.2%) had a history of thyroid problems.

Similar to our study, Mahajan et al. [21] found that the majority of cases were delivered vaginally, followed by LSCS, and LSCS was more likely in cases with thyroid dysfunction than in euthyroid patients (OR=1.38). Other investigations, such as Taha et al [22] and Sreelatha et al [23], revealed a 30.2% and 22.9% incidence of LSCS in persons with subclinical hypothyroidism, respectively. The frequency of LSCS is higher in thyroid dysfunction because it has irreversible effects on the foetus and placenta throughout early pregnancy, increasing the risk of foetal distress in birth. Thyroid dysfunction was associated with a higher proportion of LSCS and preterm birth.

Thyroid disorder can have an impact on both maternal and foetal health outcomes. Hypothyroidism raises the risk of preeclampsia, anaemia, miscarriage, placental abruption, and preterm birth. It has an impact on foetal growth, particularly brain development, which can lead to cognitive and psychomotor issues. The average TSH levels in cases was 1.86 ± 1.37 mIU/L. Based on blood TSH levels, five (1.42%) pregnant women had hyperthyroidism, while eleven (3.13%) had hypothyroidism. There was no significant association between foetal weight and TSH ($p = 0.321$). The mean TSH value for hyperthyroidism is 0.089 ± 0.097 mIU/L, while hypothyroidism is 4.62 ± 2.39 mIU/L. Mahajan et al [21] observed a similar prevalence, with 12.45% of cases having thyroid dysfunction. The prevalence of both overt hypothyroidism and subclinical hypothyroidism was 2.34% & 9.54%, respectively. The prevalence of hyperthyroidism was 0.58%. The mean TSH values in subclinical hypothyroid patients were 4.95±3.51, in overt hypothyroidism was 6.13±2.31, and in hyperthyroidism was 0.06±0.05. Mahadik et al. (24) reported that 11% of the patients showed thyroid dysfunction. The prevalence of subclinical hypothyroidism, overt hypothyroidism, and subclinical hyperthyroidism were 5.6%, 3.5%, and 1.5%, respectively. The mean TSH levels for subclinical hypothyroidism, overt hypothyroidism, and subclinical hyperthyroidism were 8.02 ± 1.25mIU/ml, 11.92 ± 5.34mIU/ml, and 0.07 ± 0.03mIU/ml. Taha et al. (22) and Singh et al. (19) showed subclinical hypothyroidism prevalence rates of 14.9% and 18%, respectively. Gupta et al. reported a prevalence of thyroid dysfunction of 10.40%, with hypothyroidism and hyperthyroidism at 6.47% and 3.93%, respectively. Other Indian research found a lower frequency of subclinical hypothyroidism Between 6-7.2% . [26-29] The prevalence fluctuates due to variations in iodine deficiency between regions.

CONCLUSION

This study highlights the prevalence and impact of thyroid dysfunction and anaemia during pregnancy on foetal outcomes. The majority of pregnant women (95.45%) were euthyroid, while 3.13% had hypothyroidism and 1.42% had hyperthyroidism. Anaemia was prevalent in 54.55% of participants, with moderate anaemia being the most common. Low birth weight (LBW) was observed in 15.06% of newborns.

Despite the presence of thyroid dysfunction and anaemia, statistical analysis did not establish a significant association between these conditions and LBW ($p > 0.05$). Given the potential maternal and foetal complications associated with thyroid dysfunction, routine screening and early intervention during pregnancy are recommended to improve maternal and neonatal health outcomes.

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