Original Article

Iodine Status, Thyroid Disorder and Feto-Maternal Outcome among the Tribal Pregnant Women of Eastern Himalayas

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Abstract

Introduction: Iodine deficiency and thyroid disorder during pregnancy have adverse effects on fetal and neonatal outcomes. **Objective:** To assess iodine status and thyroid functioning during pregnancy and to evaluate the feto-maternal outcome. **Methods:** Urinary iodine content (UIC) is determined by arsenic cerium catalytic spectrophotometry method and thyroid hormone analysis was carried out by chemiluminescence assay. Fetal and neonatal outcomes were obtained from hospital records. **Results:** Among the considered tribal pregnant women 56.75% had insufficient urinary iodine and 24.5% had a thyroid disorder. Thyroid disorder was more common in pregnant women with urinary iodine concentration (UIC) <99 μg/L than UIC >150 μg/L (56.75% vs 41.5%). Pregnant women with UIC<99 μg/L had a higher incidence of anemia (86.36%), gestational diabetes mellitus (GDM) (3.33%), and preeclampsia (5.71%) than UIC >150 μg/L. The fetal outcome with UIC <99 μg/L had a higher incidence of low birth weight (9.09%) and preterm births (1.9%). Stillbirths were distributed equally among different UIC groups. The neonatal outcomes with UIC <99 μg/L between 150-249 μg/L had a higher incidence of respiratory distress (5.23%). Hypothermia was equally distributed among different UIC groups. Subclinical hypothyroid had a high prevalence of anemia (62.96%), preeclampsia (3.7%), and GDM (6.17%) respectively than the euthyroid group. The fetal outcome with low birth weight (LBW) (9.87%), stillbirths (3.7%), and preterm birth (8.64%) was more common in the subclinical hypothyroid than in the euthyroid group. Among the neonatal outcomes respiratory distress (6.17%) and hypothermia (4.93%) were more common in subclinical hypothyroid than euthyroid pregnant women. **Conclusion:** Insufficient maternal iodine and thyroid disorders during pregnancy were associated with adverse pregnancy outcomes.

Keywords: Feto-maternal outcome, iodine status, pregnant women, thyroid disorder

Introduction

Iodine demand during pregnancy increases by about 50% due to increased renal iodine excretion, increased thyroid production, and fetal iodine requirements.[1] Assessment of thyroid functioning in pregnancy is important for gestational maternal health and normal obstetric outcome. Maternal iodine and thyroid hormones should be maintained as it is carried to the fetus during pregnancy through the placenta and amniotic fluid. According to WHO guidelines, adequate median urinary iodine for pregnant women is 150-249 μg/l.[2]

Prevalence of hypothyroidism during pregnancy shows a wide geographic variation worldwide of 0.2%- 2.5%.[3,4] The prevalence of hyperthyroidism in many studies is less than hypothyroidism ranging between 0.1% and 1% of subclinical and overt hyperthyroidism.[5] Abnormalities in thyroid function have a higher risk of infertility, miscarriage, and adverse outcomes for obstetric and fetal complications.[6] Obstetric complications include anemia, preeclampsia, placenta abruption, and postpartum hemorrhage. Fetal abnormalities include preterm birth, low-birth weight (LBW), miscarriage, perinatal death, and congenital hypothyroidism.[7]

This study was conducted in an iodine-depleted region of the Dima Hasao district of Assam in the eastern region of the Himalayas. This region represents linguistically unique tribal communities. The considered pregnant women belonged to various ethnic tribes namely Dimasa, Hmar, Mizo, Kuki,

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Zeme Naga, Biate, and Garo of Mongoloid race. The study was undertaken to demonstrate the iodine status of pregnant women, and its impact on thyroid functioning belonging to Mongoloid race of the Eastern Himalayan range. Further, the fetal outcome of those pregnancies in relation to iodine status and thyroid function was revealed.

Material and Methods

Study population

This study was approved by Institutional Ethics Committee (Bodoland University), Vide letter number IEC/BU/NFST/2020-1 dated 5th March 2020.

The study design-The study was conducted for one year from March 2021- February 2022. The studied population included pregnant women attending Haflong Civil Hospital, Dima Hasao, Assam, a three-tier health care system. Initially, 569 pregnant women were included however, 400 pregnant women were considered in the study as 102 had incomplete questionnaires and 67 were unable to follow up. The questionnaire included gestational age at the time of sample collection, maternal age, and medical history along with other demographic parameters. Written consent was obtained from all 400 pregnant mothers/caretakers.

Inclusion criteria

Women who were pregnant 8 times and resided a minimum of five years in the study area were included. The age range was from 18- 40 years.

Exclusion criteria

Women with previous records of thyroid disorder are under medication for thyroid disorder.

Urinary iodine concentration

5 ml of early morning spot urine samples (between 8:00 am - 10:00 am) were collected from all pregnant mothers during a routine visit. From each pregnant woman, one urine sample was collected in urine cups. The samples were kept frozen at 4°C until analysis. UIC was measured by dry ashing and then its catalytic action on the reduction of ceric ions to cerous ions by arsenic in the presence of iodide.[8] The decrease in yellow over a given time is measured by UV-VIS spectrophotometric method. (SHIMADZU, Model no- UV-19001)

Thyroid function test

Approximately 5 ml of venous blood was collected from all the pregnant women under aseptic conditions in an EDTA-clotted vial with an individual ID number. Information on individuals' names, sex, age, and date of the test was recorded. The samples were centrifuged at 2000 rpm per minute for 30 minutes. The serum was labeled and stored at -20 ° C. The thyroid stimulating hormone (TSH), thyroxine (T_4), and triiodothyronine (T_3) were measured by the chemiluminescence immunoassay method (Roche Diagnostics, Germany). Subclinical hypothyroidism (SCH) was diagnosed if T_4 levels were normal and serum TSH elevated (>6.5 mu/L) and subclinical hyperthyroidism was diagnosed if TSH was low (<0.4 mu/L) with the presence of normal serum T_4 concentrations. Overt hypothyroidism was diagnosed if T_4 is low (<4.5 µg/dL) with the presence of high TSH (>6.5 mu/L) and overt hyperthyroidism by high T4 level (>12 µg/dL) and low TSH level (<0.1 mu/L). The classification was based on American Thyroid Association.[1]

Pregnancy outcomes

Different pregnancy outcomes, including maternal, fetal, and neonatal complications were obtained from the health centers. Maternal complications included anemia, where the hemoglobin level is 120 g/l or less in women and 110 g/l or less in pregnant women[9]; gestational diabetes mellitus (GDM), a condition where the blood sugar level increases during pregnancy where a hormone made by placenta prevents the body from using insulin effectively; preeclampsia, a high blood pressure (hypertension) disorder that occurs during pregnancy. Fetal complications included low birth weight (LBW) where the birth weight is less than 2,500 g irrespective of the gestational age[10]; stillbirth, the death or loss of a baby before or during delivery and preterm birth, birth before 37 weeks of pregnancy. Neonatal complications included respiratory distress, where the lungs become inflamed from an infection or injury; hypothermia, low body temperature, early neonatal death, and deaths among live births during the first 28 completed days of life.

Statistical analysis

The data were analyzed by SPSS (Version 26.0., 2019, NY: IBM Corp). For descriptive statistics, the percentage, mean and median of different variables were calculated. "Chi square test" was used to assess the difference between variables. An Independent sample *t*-test was used to compare the means of two separate sets of independent samples. For comparison of the mean of more than two samples, an analysis of variance test was used. A *P* value of <0.05 was considered significant.

Results

Urinary iodine in pregnant women

The median UIC of 400 pregnant women was 145.6 µg/l, which did not meet the adequate iodine level. Among the considered groups adequate iodine was seen in 168 (42%) cases. Mild iodine and moderate iodine deficiency were seen in 210 (52.5%) and 22 (5.5%) cases respectively. In the euthyroid group, 109 (36.09%) cases had adequate iodine, 178 (58.9%) had mild iodine deficiency and 13 (4.3%) had moderate iodine deficiency [Table 1].

Thyroid disorder in pregnant women

Out of 400 women, 302 (75.5%) were euthyroid. Hypothyroidism was present in 96 (24%) of the considered group and 2 (0.5%) had hyperthyroidism. Subclinical hypothyroidism was present in 81 (20.25%) cases followed by overt hypothyroidism in 15 (3.75%) cases. Subclinical hyperthyroidism was present in 2 (0.5%) cases. There were no cases of overt hyperthyroidism among the considered pregnant women [Table 2].

Maternal UIC and thyroid disease

Among subclinical hypothyroid, adequate iodine was seen in 48 (59.25%) cases, and mild and moderate deficiency was seen in 27 (33.33%) and 6 (7.4%) cases respectively. In overt hypothyroidism, adequate iodine was seen in 9 (60%) cases, and mild and moderate iodine deficiency was seen in 5 (33.33%) and 1 (6.66%) cases. Subclinical hyperthyroid with adequate iodine was seen in 2 (100%) cases. No mild and moderate iodine deficiency was observed in this group. The value of the Pearson correlation coefficient between maternal UIC and thyroid disease is 0.291 with a *P* value of 0.5, which was statistically insignificant. The incidence of thyroid disease in pregnant women with UIC 50-99 µg/L was higher than UIC >99 µg/l. (56.75% vs 41.5%) [Table 1].

Maternal iodine status and pregnancy outcomes

The associations between maternal UIC and pregnancy outcomes are listed in Table 3. 16 pregnant women (9.5%) with adequate iodine were anemic, 81 (38.57%) and 19 (86.36%) anemic pregnant women had mild and moderate iodine deficiency respectively. Maternal UIC and anemia were found to be statistically significant with $P = 0.00$. After adjusting maternal age with UIC between 159-249 µg/L, a lower incidence of anemia was found as compared to the UIC <50 µg/L. Gestational diabetes mellitus (GDM) with adequate iodine was seen in 3 (1.78%) pregnant women and 7 (3.33%) in mild iodine deficiency pregnant women. Maternal UIC and GDM were found to be statistically significant with $P = 0.02$. Preeclampsia with inadequate iodine, mild and moderate iodine was present in 3 (1.78%), 12 (5.71%), and 2 (9.09%) pregnant women respectively. Maternal UIC and preeclampsia were found to be statistically significant with $P = 0.04$.

Fetal outcomes in this study include low birth weight (LBW), stillbirth, and preterm births. LBW with adequate iodine, mild and moderate iodine deficiency was seen in 1 (0.59%), 11 (5.23%), and 2 (9.09%) pregnant women respectively. Maternal UIC and LBW were found to be statistically significant with $P = 0.04$. Stillbirths with adequate iodine, and mild iodine deficiency was seen in 2 (1.2%), and 4 (1.9%) pregnant women respectively. No, stillbirths are recorded among moderate iodine deficiency women. Maternal UIC and stillbirths were found to be statistically insignificant with $P = 0.693$. Preterm births with adequate iodine and mild and moderate iodine deficiency were in were seen in 4 (2.38%), 8 (3.8%), and 1 (4.54%) pregnant women respectively. Maternal UIC and preterm births were found to be statistically insignificant with $P = 0.365$. LBW, stillbirths, and preterm births of UIC between 159-249 µg/L had lower incidence compared to the UIC <50 µg/L.

Neonatal outcomes included respiratory distress, hypothermia, and early neonatal death. Respiratory distress with adequate iodine and mild and moderate iodine deficiency was seen in 1 (1.1%), 11 (5.23%), and 1 (4.54%) pregnant women respectively. Hypothermia with adequate iodine was recorded in 6 (3.57%) while hypothermia with mild iodine deficiency was recorded in 7 (3.33%). Early neonatal death was observed in 1 (4.54%) neonate where the mother was of moderate iodine deficiency. Maternal UIC was found to be statistically insignificant with respiratory distress, hypothermia, and early neonatal death with *P* values 0.365, 0.681, and 0.44 respectively.

Maternal thyroid disease and pregnancy outcomes

The associations between maternal thyroid function and pregnancy outcomes are listed in Table 4. In the euthyroid group, maternal complications were seen 77 (25.49%) cases out of which anemia, GDM, and preeclampsia were seen in 59 (19.5%), 7 (2.31%), and 11 (3.64%) cases respectively. Among 81 subclinical hypothyroidism groups, anemia, GDM, and preeclampsia were seen in 51 (62.96%), 3 (3.7%), and

Table 1: Description of urinary iodine concentration among different conditions of thyroid. Parenthesis shown in percentage

Parameters	Euthyroid *n*=302 (%)	Hypothyroidism		Hyperthyroidism	
		Subclinical *n*=81 (%)	Overt *n*=15 (%)	Subclinical *n*=2(%)	Overt *n*=0 (%)
Adequate iodine (150-249 µg/L)	109 (36.09)	48 (59.25)	9 (60)	2 (100)	0 (00)
Mild iodine deficiency (100-149 µg/L)	178 (58.9)	27 (33.33)	5 (33.33)	0 (00)	0 (00)
Moderate iodine Deficiency (50-99 µg/L)	13 (4.3)	8 (9.87)	1 (6.66)	0 (00)	0 (00)

Table 2: Distribution of thyroid disorders in pregnant women according to age group. Parenthesis shown in percentage

Thyroid Status	Overall (*n*%)	<20 years (*n*%)	21-30 years (*n*%)	31-40 years (*n*%)
Euthyroid	302 (75.5)	119 (29.75)	99 (24.75)	84 (21)
Subclinical hypothyroid	81 (20.25)	7 (1.75)	59 (14.75)	15 (3.75)
Overt hypothyroid	15 (3.75)	2 (0.5)	4 (1)	9 (2.25)
Subclinical hyperthyroid	2 (0.5)	0 (0)	1 (0.25)	1 (0.25)
Overt hyperthyroid	0 (0)	0 (0)	0 (0)	0 (0)

Table 3: Maternal iodine and pregnancy outcome. Parenthesis shown in percentage

	Adequate iodine (150-249 μg/l) *n*=168 (%)	Mild iodine deficiency (100-149 μg/l) *n*=210 (%)	Moderate iodine deficiency (50-99 μg/l) *n*=22 (%)
Maternal effects			
Anemia	16 (9.5)	81 (38.57)	19 (86.36)
GDM	3 (1.78)	7 (3.33)	0 (0)
Preclampsia	3 (1.78)	12 (5.71)	2 (9.09)
Fetal Outcomes			
LBW	1 (0.59)	11 (5.23)	2 (9.09)
Still births	2 (1.2)	4 (1.90)	0 (0)
Preterm births	4 (2.38)	8 (3.80)	1 (4.54)
Neonatal Outcomes			
Respiratory distress	1 (1.1)	11 (5.23)	1 (4.54)
Hypothermia	6 (3.57)	7 (3.33)	0 (00)
Early neonatal death	0 (0)	0 (0)	1 (4.54)

Table 4: Effect of thyroid disorders in pregnant women showing fetal and neonatal outcomes. Parenthesis shown in percentage

	Euthyroid *n*=302 (%)	Hypothyroidism		Hyperthyroidism	
		Subclinical *n*=81 (%)	Overt *n*=15 (%)	Subclinical *n*=2 (%)	Overt *n*=0 (%)
Maternal Effects					
Anemia	59 (19.5)	51 (62.96)	5 (33.33)	1 (50)	0 (0)
GDM	7 (2.31)	3 (3.7)	0 (00)	0 (0)	0 (0)
Preeclampsia	11 (3.64)	5 (6.17)	0 (00)	1 (50)	0 (0)
Feta l Outcomes					
LBW	5 (1.65)	8 (9.87)	1 (6.66)	0 (0)	0 (0)
Still births	3 (0.99)	3 (3.7)	1 (6.66)	0 (0)	0 (0)
Preterm birth	5 (0.06)	7 (8.64)	1 (6.66)	0 (0)	0 (0)
Neonatal Outcomes					
Respiratory distress	7 (2.31)	5 (6.17)	1 (6.66)	0 (0)	0 (0)
Hypothermia	9 (2.98)	4 (4.93)	0 (0)	0 (0)	0 (0)
Early neonatal death	0 (00)	1 (1.23)	0 (0)	0 (0)	0 (0)

5 (6.17%) cases respectively. Out of 15 overt hypothyroidism groups, anemia was seen in 5 (33.33%) cases. 1 (50%) case of subclinical hyperthyroidism was anemic and had preeclampsia condition. Maternal thyroid disorder was found to be statistically significant with anemia where $P = 0.00$, GDM where $P = 0.04$, and preeclampsia where $P = 0.03$.

In fetal outcome, LBW, stillbirths, and preterm births were recorded in 5 (1.65%), 3 (0.99%), and 5 (0.06%) cases respectively in the euthyroid group. In subclinical hypothyroid LBW, stillbirths and preterm birth were recorded in 8 (9.87%), 3 (3.7%), and 7 (8.64%) cases respectively. In overt hypothyroidism LBW, stillbirths and preterm birth were recorded in 1 (6.66%) case. Among 2 cases of subclinical hyperthyroidism, no record of LBW, stillbirth, and preterm birth was found. Maternal thyroid disorder was found to be statistically significant only with LBW where $P = 0.04$. Stillbirths and preterm births were statistically insignificant with P values of 0.421 and 0.211 respectively.

Among the neonatal outcomes of the euthyroid category, respiratory distress, and hypothermia were recorded in 7 (2.31%) and 9 (2.98%) cases respectively. No neonatal death was recorded in this category. In subclinical hypothyroid respiratory distress and hypothermia were recorded in 5 (6.17%) and 4 (4.93%) cases respectively. 1 (1.23%) neonatal death was also recorded in subclinical hypothyroidism. In overt hypothyroidism 1 (6.66%) showed respiratory distress with no other abnormal outcomes. Subclinical hyperthyroidism did not show any abnormal outcomes in the considered group. Maternal thyroid disorder was not statistically significant for respiratory distress, hypothermia, and neonatal death where $P = 0.562$, $P = 0.339$, and $P = 0.922$ respectively.

Discussion

This study is the first of its kind to show the impact of iodine and thyroid functioning on maternal and obstetric outcomes among the ethnic tribes of Northeast India. The study area is located in the iodine-deficient goitrogenic belt of the Eastern Himalayas. Iodine is an important factor in the growth and development of the fetus. Severe iodine deficiency in pregnant women is associated with spontaneous abortion, endemic cretinism, preterm birth, stillbirth, low birth weight (LBW), fetal growth restriction (FGR), and neurological damage.[11]

We observed that 63.2% of the studied pregnant women had iodine deficiency out of which 58.9% had mild and 4.3% had moderate iodine deficiency. 36.09% of pregnant women showed sufficient iodine status in the studied population. A study performed among the pregnant and non-pregnant tribal and general women population of Tripura showed the prevalence of severe, moderate, and mild iodine deficiency in 4.1%, 15.1%, and 29.6% respectively.[12] Another study conducted among the tribal population of pregnant women in Orissa showed 33.33% had urinary iodine excretion <100 mcg/l and 66.66% of women had urinary iodine excretion >100 mcg/l.[13] Pregnant women with moderate iodine deficiency (50-99 µg/L) were highly anemic (86.36%) followed by mild iodine deficiency (38.57%) and this difference was statistically significant ($P = 0.00$) In a study conducted in Bangladesh, 16.4% of pregnant women with iodine deficiency was anemic.[14] GDM was highest (3.33%) among pregnant women with mild iodine deficiency and this difference was statistically significant ($P = 0.02$). No cases of GDM were recorded in moderate iodine deficiency indicating that low iodine level is not associated with increased GDM and is similar to the study done in Finnish pregnant women.[15]

In this study, preeclampsia cases were higher in the moderate iodine deficiency category (9.09%) and this difference was statistically significant ($P = 0.04$). Insufficient iodine intake in pregnant had a higher risk of preeclampsia in the mild and moderate iodine-deficient populations.[16]

In this study, the neonates of mothers with UIC with moderate and mild iodine deficiency of 5.23% and 9.09% respectively had a higher incidence of LBW than UIC groups which had a higher range of UIC and this difference was statistically significant ($P = 0.04$). This study was consistent with a study conducted in Henan Province of China.[17] Equal distribution of still and preterm births among different UIC groups was recorded and this difference was statistically insignificant ($P = 0.693$, $P = 0.365$ respectively). Similar to the study among Chinese pregnant women[17] but increased risk of preterm delivery was seen in another study conducted among pregnant women of UIC <50 µg/L[18]

Respiratory discomfort contributes to iodine deficiency in the neonate.[18,19] Among the neonates, respiratory uneasiness and hypothermia were recorded with only one case of neonatal death. Respiratory distress was higher in neonates (4.54%-5.23%) where the maternal UIC was not sufficient and the difference was statistically insignificant ($P = 0.365$). Higher than our study, 10.1% of pregnant women with iodine deficiency had neonates with respiratory distress.[20] Hypothermia was equally distributed among every group of maternal UIC and the difference was statistically insignificant ($P = 0.681$). Early neonatal death was recorded in our group where maternal UIC ≤99 µG/L and the difference was statistically insignificant ($P = 0.44$)

The transfer of thyroxine and iodine from the mother to the fetus is essential for proper brain development and thyroid function in the fetus probably due to an increase in renal iodine clearance (RIC) thereby increasing maternal thyroid hormone production by 50%.[1] A Different study done in cities of India shows a prevalence of hypothyroidism in 11.07%-13.13% of pregnant women. A meta-analysis done in India showed the prevalence of hypothyroidism in 11.07% of pregnant women among which subclinical and overt hypothyroidism was prevalent in 9.52% and 2.74% respectively.[21] This study showed the prevalence of thyroid disorders in pregnant women at 24.5%, with subclinical hypothyroidism at 20.25%, overt hypothyroidism at 3.75%, and subclinical hyperthyroidism at 0.5%. In this study, there was no record of overt hyperthyroidism. A similar study in Nepal recorded the prevalence of thyroid disorders in 24.62% of pregnant women, with subclinical hypothyroidism in 19.75% of cases followed by overt hypothyroidism in 4.3% of cases is consistent with our study with 20.25% subclinical and 3.75% overt hypothyroidism.[22] The higher burden in these regions may be attributed to iodine deficiency.

During pregnancy, abnormal thyroid function have an adverse effect on maternal, fetal, and neonatal outcomes. Different maternal conditions are anemia, GDM, miscarriage, and sometimes even maternal death. A global report by WHO shows the prevalence of anemia for pregnant women is 38.2% and the main reason is considered iodine deficiency causing thyroid disease.[23] The maternal outcome in our study has a higher incidence of anemia, 62.96% among the subclinical hypothyroid pregnant women than the euthyroid group with only 19.5%, and the difference was statistically significant ($P = 0.00$). A study in Andhra Pradesh tried to find the correlation between thyroid dysfunction with anemia and revealed 51.2% of thyroid pregnant women were anemic which is similar to our study.[24]

Higher TSH in early pregnancy is associated with an increased risk of GDM.[25] In our study, a higher prevalence of GDM was observed in hypothyroidism (3.7%) than euthyroid group (2.31%) and the difference was statistically significant ($P = 0.04$). No cases of GDM were observed in hyperthyroid pregnant women. No cases of GDM were observed in hyperthyroid pregnant women.

Thyroid functioning is associated with the severity outcome of preeclampsia.[26] Pregnant women having preeclampsia condition in our study is higher in the hyperthyroid (50%) than euthyroid group (3.64%) and the difference was statistically significant ($P = 0.03$). It is consistent with many studies where hyperthyroidism was related to hypertensive disorders which induced preeclampsia.[27]

Thyroid abnormalities in the mother show a higher risk of non-communicable diseases in a fetus with LBW or being born small for gestational age (SGA) which might lead to neonatal mortality and morbidity.[28] In this study, LBW, stillbirths, and preterm births were more common in thyroid disorder subjects than in euthyroid cases. LBW was found to be more common in subclinical hypothyroidism (9.87%)

than euthyroidism (1.65%) and the difference was statistically significant (P = 0.04). It is similar to the study which showed maternal subclinical hypothyroidism was associated with a higher risk of LBW compared to euthyroidism (11·8% vs 10·0%)[29]

Few studies had found a higher risk of stillbirths when TSH levels were elevated.[30] In this study, stillbirth was more common in overt hypothyroidism (6.66%) and subclinical hypothyroidism (3.7%) than the euthyroid pregnant women (0.99%) and the difference were statistically insignificant (P = 0.421). However, in another study, the incidence of thyroid with stillbirth was higher in subclinical hypothyroidism (4.6%) than in overt hypothyroidism (1.6%).[19]

Maternal thyroid disorders have been associated with an increased rate of preterm birth in some studies showing a positive correlation while others do not showing no correlation.[31] In our study, preterm birth rate was highest among the subclinical hypothyroidism (6.66%) than the euthyroid group (0.06%) and the difference was statistically insignificant (P = 0.211). It is similar to other studies which had a 2-3-fold higher incidence of preterm birth in subclinical hypothyroid pregnant women.[17]

Our study recorded a higher incidence of respiratory distress among hypothyroidism (6.66%) than euthyroid pregnant women. (2.31%) and the difference was statistically insignificant (P = 0.562). Hypothermia was also observed in the neonates of mothers with subclinical hypothyroid (4.93%) than in euthyroid mothers (2.98%) and the difference was statistically insignificant (P = 0.339). Another study in Central India recorded the prevalence of hypothermia in subclinical hypothyroid (2.7%) with no significant outcome in relation to euthyroid pregnant women (0.8%).[32] One neonatal death was observed among subclinical hypothyroid (1.23%) pregnant women and the difference were statistically insignificant (P = 0.922).

Limitations of the study

Since this study was conducted in a three-tier healthcare system, many obstetric complications could not be detected due to a lack of poor healthcare facilities for diagnosis and treatment. Further; urine and blood samples were collected from the different gestational periods, thereby variation in physiological changes might not give a true depiction of the current scenario.

Conclusion

The current study revealed maternal iodine status and thyroid disorders during pregnancy were associated with adverse maternal, fetal, and neonatal outcomes among the pregnant tribal women residing in the hilly area of Assam. Extensive studies among such marginalized pregnant women, improvement of health care facilities along with awareness generation about the outcomes related to maternal thyroid disorder should be carried out in order to avoid obstetric complications because of iodine deficiency and thyroid disorders.

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Conflicts of interest

There are no conflicts of interest.

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