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Original Article

MATERNAL AND FETAL OUTCOMES IN HYPOTHYROID PREGNANT WOMEN: INSIGHTS FROM A HOSPITAL-BASED STUDY IN MANDI, HIMACHAL PRADESH

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ABSTRACT

Objective: Thyroid disorders significantly impact maternal and fetal health during pregnancy, with thyroid hormone balance being crucial for fetal development. Hypothyroidism, a common disorder among women of childbearing age, can lead to adverse pregnancy outcomes, including subtle thyroid dysfunction and autoimmune conditions. Diagnosing thyroid disorders in pregnancy is challenging due to overlapping symptoms with normal pregnancy changes and various contributing factors.

Methods: In this prospective observational study conducted in Mandi, Himachal Pradesh, we focused on pregnant women attending the first-trimester antenatal clinic. Inclusion criteria comprised pregnant women aged 18 or older, regardless of their gravidity and parity, who provided informed consent. Exclusions were made for comorbidities such as diabetes, hypertension, renal or liver disease, multifetal gestation, and previous bad obstetric history. A total of 300 hypothyroid pregnant women were selected through convenience sampling. We assessed serum thyroid-stimulating hormone (TSH) levels using chemiluminescent microplate immunoassay (CMIA) and administered adequate L thyroxine treatment to maintain TSH levels below 2.5 mIU/l.

Results: Maternal outcomes exhibited variation, with common delivery methods being cesarean sections (both emergency and elective) and normal vaginal deliveries. Some pregnancies faced complications, including gestational diabetes mellitus, preterm birth, and placenta previa. Neonatal outcomes ranged from healthy newborns to those with low Apgar scores, intrauterine demise, low birth weight, and stillbirth. Adequate treatment with L thyroxine was observed in 60.6% of cases, emphasizing the need for improved hypothyroidism management during pregnancy.

Conclusion: Our study underscores the diversity of maternal and neonatal outcomes associated with hypothyroidism during pregnancy in a hilly region of India. Early detection, comprehensive antenatal care, and optimal thyroid hormone management are vital to minimize complications and promote the well-being of both mothers and newborns. Further research and awareness campaigns are essential for enhancing thyroid disorder screening and management in pregnancy.

Keywords: Thyroid disorders, Hypothyroidism, Pregnancy complications, L thyroxine, Maternal outcomes, Neonatal outcomes, Thyroid-stimulating hormone, Antenatal care, Mandi, Himachal Pradesh

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INTRODUCTION

The interplay between thyroid disorders and women's health has been noted for centuries, with observations of gender-specific thyroid gland differences dating back to the Renaissance era. The thyroid gland, a crucial endocrine organ, undergoes significant hormonal fluctuations during pregnancy. Maintaining proper thyroid hormone levels is essential for maternal well-being and optimal fetal development [1].

Hypothyroidism, a common thyroid disorder in women of childbearing age, poses particular concerns during pregnancy. While overt hypothyroidism is linked to adverse pregnancy outcomes, emerging evidence suggests that even subtle thyroid dysfunction and autoimmune thyroid conditions may have detrimental effects [2].

Diagnosing thyroid disorders during pregnancy is challenging, as symptoms can mimic normal pregnancy changes. Nutritional deficiencies, autoimmune thyroiditis, and, rarely, thyroid nodules and cancers contribute to these conditions [3].

Hypothyroidism manifests as low thyroid hormone levels and elevated TSH levels, arising from either reduced thyroid hormone production (primary hypothyroidism) or insufficient TSH secretion (central hypothyroidism). Global prevalence ranges from 0.6 to 12 per 1000 women and 1.3 to 4 per 1000 men [4].

Risk factors for thyroid disease in women include age (15-35 y), family history, high BMI, infertility history, autoimmune disorders, certain medications, and recent neck radiation. Untreated hypothyroidism during pregnancy poses risks for both mother and fetus, including obstetric complications and potential neurocognitive developmental impairments in the child. Maternal thyroid hormones are essential for fetal neural development [5].

Prevalence rates of hypothyroidism in pregnancy vary, with higher rates reported in some Asian regions. The debate on universal thyroid screening during pregnancy continues. Given the ongoing controversy and limited data on maternal and fetal outcomes in hilly regions of India, this study aims to shed light on the health of hypothyroid pregnant women and their offspring [6].

MATERIALS AND METHODS

Study design

The present study is a prospective observational study conducted among pregnant women attending the antenatal clinic in their first trimester at the Department of Obstetrics and Gynaecology in Shri Lal Bahadur Shastri Government Medical College and Hospital, Mandi (HP).

Study period

The study was conducted among all available pregnant women in the first trimester between 01st Apr 2021 to 31st Mar 2022 who fulfilled the inclusion criteria.

Study setting

This hospital-based study was carried out among all available and consenting pregnant women attending antenatal clinic in their first trimester who were in active follow-up and undergoing antenatal checkups.

Inclusion criteria

1. Pregnant women in the first trimester aged 18 y and above.
2. Singleton pregnancy.
3. Primigravida or multigravida.
4. Patients who were in regular follow-up.
5. Patients agreeing with "signed and informed consent."

Exclusion criteria

Cases with the following findings were excluded:

1. Diabetic patients with pregnancy.
2. Hypertension with pregnancy.
3. Renal disease with pregnancy.
4. Liver disease with pregnancy.
5. Multifoetal gestation.
6. Previous bad obstetric history with a known cause.
7. Patients not giving "informed consent."

Study population (sample size)

All patients fulfilling the inclusion and exclusion criteria and visiting the OPD at the Department of Obstetrics and Gynaecology in Shri Lal Bahadur Shastri Government Medical College and Hospital, Mandi (HP) during the study period (01st April 2021 to 31st March 2022) were included. A total sample of 300 pregnant hypothyroid patients was selected using convenience sampling.

Method of data collection

The present observational prospective study was undertaken at Shri Lal Bahadur Shastri Government Medical College and Hospital, Mandi (Himachal Pradesh) in the Department of Obstetrics and Gynaecology, where pregnant women attending antenatal clinic in their first trimester were screened with serum TSH.

Sample collection method

Serum TSH estimation was done in fasting blood samples. Three ml of patients' venous blood samples were obtained under aseptic procedures and transferred to standard gel separator tubes.

Estimation of TSH

Estimation of TSH was done by chemiluminescent microplate immunoassay (CMIA). ARCHITECT TSH is a two-step sandwich immunoassay.

Estimation of fT4

Estimation of fT4 was done by chemiluminescent microplate immunoassay (CMIA).

Estimation of fT3

Estimation of fT3 was done by chemiluminescent microplate immunoassay (CMIA).

Treatment of hypothyroidism

Patients with overt and subclinical hypothyroidism were treated with L Thyroxine according to their body weight to maintain serum TSH near normal levels. Concentration of TSH was maintained up to less than 2.5mIU/l in the first trimester. All groups were monitored every 4-6 w with the estimation of serum TSH. These women were followed throughout pregnancy to know the impact of hypothyroidism on the mother and the newborn after treating the hypothyroid women with an adequate dose of L Thyroxine, depending on serum TSH. All the patients were followed till the end of pregnancy and were observed for any maternal complications occurring pertaining to low thyroxine levels and their fetal outcome.

Dependent variables: Hypothyroidism. **Independent variables:** Age at conception, Educational and Occupational status, BMI, Gravida, Parity, TSH, etc.

Statistical analysis

Statistical analysis was performed using SPSS (Statistical Package for the Social Sciences) for Windows (version 24.0). Categorical variables were described as frequency (percentage), and mean±standard deviation was used for continuous parameters. The Chi-square test and Fischer-exact test were used for statistical comparisons. A two-tailed p-value of<0.05 was considered statistically significant.

RESULTS

Maternal outcome (table 1)

Maternal outcomes among hypothyroid pregnant women were varied. The majority of deliveries were through either emergency or elective lower segment cesarean sections (LSCS), accounting for 34.1% and 16.0% of cases, respectively. Normal vaginal deliveries (NVD) were also common, occurring in 36.3% of cases. A smaller proportion of deliveries were performed using vacuum extraction (9.3%) or forceps (4.3%).

Pregnancy complications (table 2)

Pregnancy complications were observed in a subset of hypothyroid pregnant women. A significant percentage (77.5%) of the participants did not experience any complications during pregnancy. However, some participants did face various complications, including COVID-19 (0.7%), abortion (2.7%), gestational diabetes mellitus (GDM) (1.7%), an increased rate of LSCS (0.7%), pregnancy-induced hypertension (PIH) (2.0%), placenta previa (3.0%), postpartum hemorrhage (PPH) (3.7%), preterm birth (5.3%), and premature rupture of membranes (PROM) (2.7%).

Neonatal outcome (table 3)

Neonatal outcomes among the infants born to hypothyroid mothers showed a range of conditions. The majority of newborns (72.6%) had no significant health issues. However, a subset of neonates faced challenges, including low Apgar scores (APGAR<7) in 7.3% of cases, intrauterine demise (IUD) in 3.0% of cases, low birth weight (LBW) in 12.3% of cases, and stillbirth in 4.7% of cases.

Treatment with L thyroxine (table 4)

The administration of L thyroxine treatment to manage hypothyroidism in pregnant women was assessed. Adequate treatment, indicating proper management of hypothyroidism, was observed in 60.6% of cases. However, 39.4% of participants received inadequate treatment, highlighting the need for optimization in the management of hypothyroidism during pregnancy.

These results demonstrate the diverse maternal and neonatal outcomes associated with hypothyroidism during pregnancy. While many women did not experience complications, a significant proportion faced various challenges during pregnancy and childbirth. Adequate management of hypothyroidism with L thyroxine is crucial to optimize outcomes for both mothers and their newborns.

Table 1: Maternal outcome

Maternal outcome	Frequency	Percent
Emergency LSCS	103	34.1%
Elective LSCS	48	16.0%
NVD	108	36.3%
Vacuum Delivery	28	9.3%
Forceps Delivery	13	4.3%

Table 2: Pregnancy complications

Pregnancy complications	Frequency	Percent
None	235	77.5%
COVID	2	0.7%
Abortion	7	2.7%
GDM	5	1.7%
Increased rate of LSCS	2	0.7%
PIH	6	2.0%
Placenta previa	9	3.0%
PPH	11	3.7%
Preterm birth	16	5.3%
PROM	7	2.7%
Total	300	100.0%

Table 3: Neonatal outcome

Neonatal outcome	Frequency	Percent
None	218	72.6%
APGAR<7	22	7.3%
IUD	9	3.0%
LBW	37	12.3%
Stillbirth	14	4.7%
Total	300	100.0%

Table 4: Shows adequate and inadequate treatment with l thyroxine

Treatment	Frequency	Percent
Adequate	182	60.6%
Inadequate	118	39.4%

DISCUSSION

Thyroid disorders in pregnancy

Thyroid disorders play a pivotal role in the health and well-being of pregnant women and their offspring. The thyroid gland, as a key endocrine organ, undergoes significant hormonal fluctuations during pregnancy, making it crucial to maintain proper thyroid hormone levels for maternal and fetal health [7]. Hypothyroidism, a prevalent thyroid disorder in women of childbearing age, presents unique concerns during pregnancy. Although overt hypothyroidism has long been associated with adverse pregnancy outcomes, recent evidence suggests that even subtle thyroid dysfunction and autoimmune thyroid conditions can have detrimental effects [8].

Challenges in diagnosing thyroid disorders during pregnancy

Diagnosing thyroid disorders during pregnancy is challenging because the symptoms can mimic normal pregnancy changes. Nutritional deficiencies, autoimmune thyroiditis, and, in rare cases, thyroid nodules and cancers can contribute to these conditions [9]. Hypothyroidism manifests as low thyroid hormone levels and elevated TSH levels, which can result from either reduced thyroid hormone production (primary hypothyroidism) or insufficient TSH secretion (central hypothyroidism). The global prevalence of thyroid disorders varies widely [10]. Risk factors for thyroid disease in women include age (15-35 y), family history, high BMI, infertility history, autoimmune disorders, certain medications, and recent neck radiation. Untreated hypothyroidism during pregnancy poses risks for both mother and fetus, including obstetric complications and potential neurocognitive developmental impairments in the child [11].

Prevalence of hypothyroidism in pregnancy

The prevalence rates of hypothyroidism in pregnancy vary, with higher rates reported in some Asian regions. The debate on universal thyroid screening during pregnancy continues. Given the ongoing controversy and limited data on maternal and fetal outcomes in hilly regions of India, this study aims to shed light on the health of hypothyroid pregnant women and their offspring [12].

Maternal outcomes

The results reveal diverse maternal outcomes among hypothyroid pregnant women. While a significant number of deliveries were conducted through normal vaginal deliveries (36.3%), cesarean sections were also prevalent, both elective (16.0%) and emergency (34.1%). Additionally, vacuum deliveries (9.3%) and forceps deliveries (4.3%) were performed in a smaller proportion of cases. These findings highlight the need for close monitoring and individualized care for hypothyroid pregnant women to minimize the risk of complications during childbirth [13].

Pregnancy complications

The study identified a range of pregnancy complications among hypothyroid pregnant women. Notably, a significant percentage (77.5%) of participants did not experience any complications during pregnancy. However, some faced various challenges, including gestational diabetes mellitus (GDM), preterm birth, and placenta previa. These findings underscore the importance of comprehensive antenatal care, including regular monitoring and early intervention, to manage and mitigate these complications effectively [14].

Neonatal outcomes

Neonatal outcomes varied among infants born to hypothyroid mothers. While the majority had no significant health issues (72.6%), a subset of neonates faced challenges such as low Apgar scores, intrauterine demise, low birth weight, and stillbirth. These results emphasize the importance of optimizing maternal thyroid function during pregnancy to enhance fetal well-being and minimize neonatal morbidity [15].

Treatment with L thyroxine

Adequate treatment with L thyroxine was observed in 60.6% of cases, while 39.4% received inadequate treatment. This finding highlights the need for improved management and optimization of hypothyroidism during pregnancy to achieve better maternal and neonatal outcomes. Close monitoring and dose adjustments are critical to maintaining thyroid function within the recommended range [16].

CONCLUSION

In conclusion, this study provides valuable insights into the maternal and fetal outcomes associated with hypothyroidism during pregnancy in a hilly region of India. It underscores the importance of

early detection, comprehensive antenatal care, and optimal thyroid hormone management to mitigate complications and promote the health of both mothers and their newborns. Further research and awareness efforts are warranted to improve thyroid disorder screening and management practices during pregnancy.

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Nil

AUTHORS CONTRIBUTIONS

All the authors have contributed equally.

CONFLICT OF INTERESTS

Declared none

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