Original Article

Prevalence of Thyroid Disorders & Pregnancy Outcomes in Patients Delivering in a Tertiary Care Center: A Retrospective Study.

Gagandeep Kour, Sapna Puri , Farhana Yaqoob ,Preetika Dutt ,Narita Jamwal.

Abstract

Introduction

Northern India is a region with high prevalence of thyroid disorders. Thyroid dysfunction in pregnancy adversely affects the maternal and perinatal outcome and is associated with maternal conditions like hypertensive disorders, anaemia, diabetes, obstetric cholestasis, placental abruption and prematurity. Also, it adversely affects the foetal development leading to low birth weight, low Apgar scores at birth, admissions to NICU and impaired neuropsychological development.

Aims and Objectives

To determine the prevalence of thyroid disorders in pregnancy in a tertiary care center and to study their pregnancy outcomes.

Material and Methods

A retrospective study was carried out in the department of obstetrics and gynaecology, Acharya Shri Chander College of Medical Sciences and Hospital, Jammu to find out the prevalence and pregnancy outcomes in patients with thyroid dysfunction delivering during the study period and to compare the outcome with euthyroid women delivering during the same period.

Results

The prevalence of hypothyroidism was found to be 33.2%. There was no case of hyperthyroidism in our study. Hypertension, cholestasis and gestational diabetes was seen in 7.4%, 18.5% and 13.6% hypothyroid women respectively which was higher than euthyroid group(4.3%, 7.3% and 3.7% respectively). Preterm birth and low birth weight was seen in 19.7% and 16.1% babies born to hypothyroid women as compared to 13.4% and 5.5% for euthyroid women. There was no significant difference in incidence of anaemia in the two groups.

Conclusion

This study showed a high prevalence of thyroid disorder. Due to the immense impact that maternal thyroid disorder has on maternal and foetal outcomes, prompt identification of thyroid disorders and timely initiation of treatment is essential

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Introduction

Maternal thyroid functions change during pregnancy. Serum beta-hCG, which rises sharply in early pregnancy, is structurally similar with serum TSH, hence cross-reactivity at the receptor stimulates the release of thyroid hormone and serum TSH levels are suppressed. Beyond first

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Keywords

prevalence, outcomes, thyroid disorders, pregnancy, gestational, foetal.

trimester, serum beta-hCG falls and serum TSH rises consequently. If adaptation to these changes is inadequate, it results in thyroid dysfunction [1].

The effect of these changes has led to the development of specific reference ranges for thyroid function tests in pregnancy [2]. The American Thyroid Association (ATA) revised recommendations in 2017 suggested that laboratory reference ranges for TSH and thyroid hormones should focus on values relevant to specific populations, prompting clinicians to seek local laboratory values [3]. If such population data is not available, both ACOG (American College of Obstetricians and Gynaecologists) and the ATA recommends subtraction of 0.5 mU/l from the upper range of TSH, that is equivalent to around 4 mU/l for most centres and above original recommendations of 2.5 mU/l or 3.0 mU/l [4].

Patients with both hyperthyroidism and hypothyroidism are at increased risk of perinatal complications such as preeclampsia, placental accidents, preterm birth and the foetal complications are prematurity, low birth weight, still birth and perinatal death. Also, there is an increased risk of NICU admissions and respiratory distress syndrome.

Pregnant women with thyroid disorders are at increased risk of adverse maternal and foetal outcomes and the benefits of early diagnosis and treatment are obvious. Therefore, routine thyroid function screening of all pregnant women is suggested [2].

There is paucity of data on prevalence of thyroid disorders in Indian pregnant women. Therefore, this study was carried out to know the prevalence of thyroid disorders in pregnant women living in and around the Jammu district of J&K and to know the outcomes of pregnancy in women suffering from thyroid disorders.

Material and Methods

A retrospective case-control study was conducted based on case records of all women delivering in the Department of Obstetrics and Gynaecology, Acharya Shri Chander College of Medical Sciences and Hospital, which is a tertiary care centre for a period of 2 years. Prior approval from Institutional Ethical Committee was obtained. All patients delivered in obstetrics and gynaecology department during study period were included in the study. Patients with multiple pregnancy, previous bad obstetric history, chronic hypertension, overt diabetes and those with incomplete records were excluded from the study.The last available TSH report in the current pregnancy was collected from case records. Based on the 2017 ATA pregnancy guidelines [3], serum TSH > 4 mIU/L in any trimester was considered elevated. Subclinical hypothyroidism was defined as high serum TSH level(>4mIU/L but <10mIU/L) in any trimesters or patients who had started thyroxine first time in current pregnancy. Overt hypothyroidism was defined as high serum TSH level(>10mIU/L) or patients taking thyroxine prior to current pregnancy [5]. The prevalence of thyroid disorder at the time of delivery and its association with various maternal and foetal outcomes was noted. Gestational age was determined based on the report on the delivery records, which were defined based on dating ultrasound. Demographic characteristics like age and parity were noted. The maternal outcomes that were noted were anaemia (haemoglobin level less than 10 g/dl), Gestational hypertension (blood pressure more than 140/90 without proteinuria after 20 weeks gestation), pre-eclampsia (blood pressure more than 140/90 with proteinuria after 20 weeks gestation), placental abruption, preterm birth, gestational diabetes (women screened positive using DIPSI method anytime during pregnancy) and obstetric cholestasis. The perinatal outcomes noted were preterm birth, low birth weight (neonatal birth weight less than 2.5 kg) and stillbirth. This association was compared between hypothyroid and euthyroid pregnancies delivered during the study period. Data was analysed and presented as frequency and percentages.

Results

In this study, 81out of 244 delivered pregnant women were found to be hypothyroid as per ATA criteria and prevalence was found to be 33.2%. Rest 163 patients were euthyroid. There was no case of hyperthyroidism in our study. Prevalence of subclinical and overt hypothyroidism was calculated to be 15.9% and 16.8% respectively. Mean age of hypothyroid women was 29.2 years which was comparable to euthyroid women which was 27.2years. Majority of women were in age group 25-30 years in both groups (45.7% and 43.5% respectively). In hypothyroid group, 45.7% were primigravida and 54% were multigravida. In euthyroid group,44.8% were primigravida and 55.2% were multigravida. Both groups were comparable with respect to age and parity (Table 1) (Figure 1 and 2). There was no significant difference in the incidence of anaemia in either group. The mean haemoglobin level was 10.5g/dl and 10.4g/dl in the hypothyroid and

Table 1. Demographic profile in hypothyroid and euthyroid women

Age (in years)	Hypothyroid (n=81)	Euthyroid
19-24	14 (17.3%)	46 (28.2%)
25-30	37 (45.7%)	71 (43.5%)
31-35	20 (24.7%)	38 (23.3%)
36-40	10 (12.3%)	08 (4.9%)
Mean ± SD	29.21 ± 4.83	27.19 ± 4.48
Obstetric History		
Multi	44 (45.7%)	90 (44.8%)
Primi	37 (54%)	73 (55.2%)
Hb level (g/dl)		
Mean ± SD	10.54 ± 1.26	10.44 ± 1.27

Figure 1: Comparison of age distribution between hypothyroid and euthyroid group

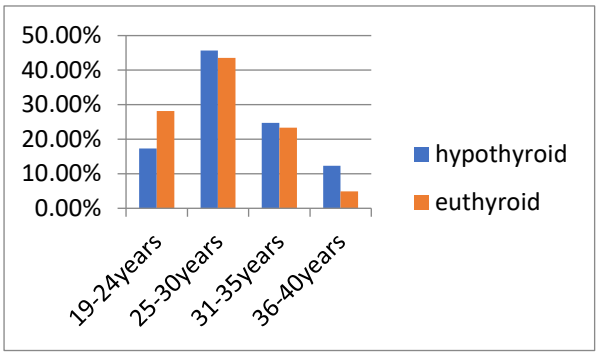

Figure 2: Comparison of age distribution between hypothyroid and euthyroid group

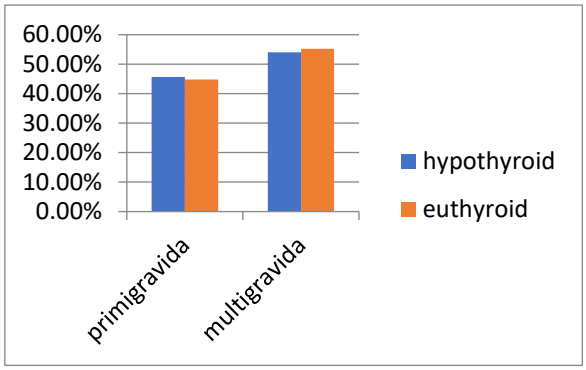

Table 2: Comparison of maternal outcomes in hypothyroid and euthyroid women

Complications	Hypothyroid (n=81)	SCH(n=39)	Overt(n=41)	Euthyroid n=163)
Anemia (<10g/dl)	24 (29.6%)	13 (33.3%)	11 (26.8%)	52 (31.9%)
HDP	06 (7.4%)	2 (5.1%)	4 (9.5%)	07 (4.3%)
Cholestasis	15(18.5%)	8 (2.6%)	7 (17.1%)	12 (7.3%)
GDM	11 (13.6%)	2 (5.1%)	9 (21.9%)	06 (3.7%)

Table 3: Comparison of perinatal outcomes in hypothyroid and euthyroid women

Complications	Hypothyroid(n=81)	SCH(n=39)	Overt(n=41)	Euthyroid (n=163)
Preterm birth(<37 weeks)	16(19.7%)	6(15.4%)	10(24.3%)	22(13.4%)
LBW (<2.5kg)	13(16.1%)	5(12.8%)	8(19.5%)	9(5.5%)

euthyroid group, respectively (Table 1). Anaemia was seen in 29.6% of hypothyroid women and 31.9% of euthyroid women (Table 2). Maternal complications like hypertensive disorders of pregnancy, obstetric cholestasis and gestational diabetes were higher in hypothyroid group (7.4%, 18.5% and 13.6% respectively) compared to euthyroid group (4.3%, 7.3% and 3.7% respectively) (Table 2) . Adverse perinatal outcome like preterm birth and low birth weight were higher among babies born to hypothyroid women (19.7% and16.1%) compared to euthyroid women(13.4% and 5.5%).There was no placental abruption or still birth in our study (Table 3).The association with hypertensive disorders, obstetric cholestasis, GDM, preterm birth and low birth weight was seen more in overt hypothyroid women than subclinical hypothyroid women.

Discussion

The prevalence of hypothyroidism in pregnant Indian population is much higher compared to western countries. Prevalence varies widely among different states in India, as we still face iodine deficiency in many parts of the country mainly Northern India. Hashimoto thyroiditis is the most common cause of hypothyroidism in iodine sufficient areas [6]. Our study being carried out in North India at a tertiary centre receiving high risk pregnancies for delivery showed a high prevalence of 33.2% which is high when compared to other regions in India and in other parts of Asia. In the sub-Himalayan region like ours, deficiency of iodine and micronutrients, due to heavy rain fall and flooding leads to decrease iodine content in soil and water. This is the cause of increased prevalence of hypothyroidism in these regions [7]. This explains the higher prevalence of thyroid disorders compared to others like study by Rajput et al(26.5%) in Haryana[8], Mahadik et al(11%) in Madhya Pradesh[9], Saradevi et al (11.6%) in Telangana[6] and Ajmani et al(13.25%) in New Delhi [10] .A cross-sectional multicentre study of different states of India reported an overall 36.1% prevalence of hypothyroidism in pregnancy according to ATA cut-offs [11]. In the present study, the prevalence of subclinical and overt hypothyroidism in pregnancy was 15.9% and 16.8%, proportion consistent with the above studies.

Uncorrected thyroid disorders in pregnancy have adverse effects on foetal and maternal well-being. Women with thyroid disorder, both overt and

subclinical, are at increased risk of pregnancy-related complications such as spontaneous abortion, preeclampsia, placental abruption and preterm labour. Foetal complications include low birth weight babies, preterm delivery & still birth.

Iron deficiency causes impairment of the haem dependent enzyme thyroid peroxidase, thereby decreasing synthesis of thyroid hormones, which can result in reduction in circulating levels of thyroid hormones. This is the reason for association of anaemia with hypothyroidism [12]. However, in our study association of anaemia with hypothyroidism was not seen. This may be the result of detection and treatment of anaemia in early pregnancy and prophylactic administration of oral iron supplementation which is routinely given to all antenatal women. Our study population was selected around the time of delivery when anaemia would have already been corrected. Meta-analysis of the five studies that reported relevant data on the relationship between anaemia and overt hypothyroidism showed that the combined OR of anaemia for hypothyroid pregnant women was 3.74 indicating that hypothyroidism is associated with gestational anaemia [13].

As thyroid hormones have many effects on cardiovascular physiology and blood pressure regulation, there is a higher prevalence of gestational hypertension compared to euthyroid women. Maternal thyroid hormones play an important physiological role in early placental development by regulating human trophoblast proliferation and invasion. Inadequate trophoblast cell invasion may result in abnormal placentation contributing to preterm delivery and placental abruption which can also lead to stillbirth [14]. Reduced foetal thyroxine can adversely affect the development of the pituitary-thyroid axis of the newborn, secretion of foetal pituitary growth hormone and cardiovascular homeostasis in utero [15,16,17]. These factors can cause reduced neonatal birth weight in babies of hypothyroid mothers at initial presentation or in third trimester.

In our study, occurrence of hypertensive disorders of pregnancy was observed more in hypothyroid group (7.4%) when compared to euthyroid group (4.3%). Also regarding perinatal outcomes, the occurrence of preterm birth and low birth weight (19.7% and 16.1%) was more in the hypothyroid group in comparison to euthyroid group (13.4% and 5.5%). Similar results were seen in the study by Mahadik et al where there was significant association between hypothyroidism and preeclampsia (15.8%), preterm birth (5.3%), low birth weight (31.6%). However, risk of anaemia was 4.8 times higher than euthyroid women unlike in our study. A Study by Sun Y Lee et al, maternal hypothyroidism(both subclinical and overt) was associated with a 2.17-fold increased risk of prematurity in offspring. Although not statistically significant, there were also increased RR for foetal loss, preeclampsia/eclampsia, and low birth weight (1.62, 1.44, 2.14 respectively)in these women[18]. As per the study done by Saradevi et al, hypothyroidism in pregnancy is associated with increased risk of complications like preeclampsia (10.9%), preterm delivery (8.7%), placental abruption (4.68%), low birth weight (6.5%) and still birth (1.56%) Abnormal thyroid function during pregnancy may affect maternal glucose homeostasis. Several mechanisms are involved in this process: reduction of the half-life of insulin; and endogenous production of thyroid hormones increases the concentration of GLUT-2 on the hepatocyte membrane [19]. In our study, occurrence of GDM was observed more in hypothyroid group (13.6%) when compared to euthyroid group (3.7%). In a study by Kiran et al, gestational diabetes was present in 21.2% cases. Many previous studies have found that clinical hypothyroidism statuses (overt/sub-clinical/isolated) are associated with an increased GDM risk [20,21,22] which is consistent with our study. Our results confirm that early parallel screening for GDM and thyroid dysfunction is crucial in order to avoid complications in the course of pregnancy.

Hypothyroidism is a common diagnosis in the women with obstetric cholestasis .It has been noted that autoimmune pathogenesis has a remarkable effect on hypothyroidism. It can be noted that there might also be an autoimmune association in the pathogenesis of obstetric cholestasis. In our study, obstetric cholestasis was seen in 18.5% of hypothyroid women which was higher compared to euthyroid women (7.3%).This association was found more in overt hypothyroid group (17.1%) explaining the autoimmune aetiology in pathogenesis. In a study by ST Hamalainen et al [23], hypothyroidism was diagnosed in 3.5% of the ICP mothers and in 1.5% of the references (OR 2.38). A study by Yang et al found that a higher level of fT4 during both early and late pregnancy was associated with a higher TBA concentration and a higher risk of ICP [24].

Conclusion

The present study reveals a high burden of hypothyroidism in pregnant women in North India especially at tertiary care centers. The geographical location and being a referral centre led our study to a high prevalence compared to rest of the states of India highlighting the need to universally screen all antenatal patients including those presenting in third trimester and during labour. The positive association of maternal and perinatal risk factors like preeclampsia, preterm birth, gestational diabetes, obstetric cholestasis and low birth weight that was found in our study emphasises the need to timely optimise the thyroid function at first diagnosis. This holds true especially in periconceptional period to screen all cases of overt hypothyroidism as these cases have strong association with adverse pregnancy outcomes due to associated autoimmune pathology.

Abbreviations

TSH: Thyroid Stimulating Hormone; hCG: Human Chorionic Gonadotrophin; ACOG: American College of Obstetricians and Gynaecologists; ATA: American Thyroid Association; NICU: Neonatal Intensive Care Unit;

DIPSI: Diabetes In Pregnancy Study Group India; HDP: Hypertensive Disorders of Pregnancy; GDM: Gestational Diabetes Melitus; SCH: Sub-clinical Hypothyroidism; LBW: Low Birth Weight; OR: Odds Ratio; RR:Relative Risk, GLUT-2:Glucose Transporter 2; ICP: Intrahepatic Cholestasis of Pregnancy.

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Conflicts of interest:
There are no conflicts of interest.

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