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Evaluation of glycemic and thyroid status in pregnant women attending routine antenatal clinic at our hospital

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Conflicts of Interest: Nil

Abstract

Background: The incidence of hypothyroidism in pregnancy is higher in Asian countries, with more observed in the Indian population being attributed to nutritional as well as immunological origins. Even sub clinical hypothyroidism (SCH) with high thyroid-stimulating hormone (TSH) and a normal thyroxine level is commonly associated with endocrine abnormalities in pregnancy. Gestational diabetes mellitus (GDM) is a frequent occurrence in the second trimester of pregnancy, with the risk being greater with increasing age. Auto immune diseases like insulin-dependent diabetes mellitus (IDDM), Hashimoto's thyroiditis, pernicious anemia, etc., are more common in women and occur concomitantly.

Aim and Objectives: to measure the levels of Serum levels of fasting blood glucose, one hour and two-hour blood glucose, TSH, FT3 and FT4 in antenatal women, to find out the prevalence of Gestational Diabetes, Sub clinical and overt Hypothyroidism in pregnancy and to measure the levels of anti-TPO antibodies all pregnant women.

Materials and Methods: Basic hematological and biochemical investigations were carried out along with thyroid function tests (TSH, FT3, FT4, anti TPO antibody titers). All the patients were subjected to first trimester ultrasound scan to confirm gestational age less than 12 weeks. The reference interval for thyroid panel were as per ATA guidelines. After general and gynecological examination, fasting, one-hour, and two-hour blood samples were collected for 75 g OGTT. Thyroid profiles were done by the chemiluminescence method.

Discussion and Conclusion: This present study revealed an increase in subclinical hypothyroidism in pregnancy in our population. A significant number of SCH with high anti-TPO antibody titer points towards autoimmunity as being a significant cause of the

decreased level of thyroid hormones in pregnancy. However, GDM prevalence was at par with the national figure but with no significant association of SCH, and a high anti-TPO ab titer was found with GDM in our study.

Keywords: pregnancy, subclinical hypothyroidism, gestational diabetes mellitus, anti TPO antibodies and thyroid stimulating hormone.

Introduction

Pregnancy has a significant effect on the thyroid gland and its functioning [1]. Hypothyroidism in pregnancy is defined as an increased TSH level in serum. Furthermore, based on free T4 levels, it is categorized into overt (lower free T4 levels) and sub clinical hypo thyroidism (normal free T4 levels) [2]. The most frequent thyroid disorder in pregnancy is maternal hypo thyroidism.

The incidence of hypo thyroidism in pregnancy is higher in Asian countries, with more observed in the Indian population being attributed to nutritional as well as immuno logical origins. Even sub clinical hypo thyroidism (SCH) with high thyroid - stimulating hormone (TSH) and a normal thyroxine level is commonly associated with endo crine abnormalities in pregnancy [3-7]. Euthyroid pregnant women with high anti-TPO antibody titers have been registered with several adversities in obstetric and fetal outcomes [8-10]. Gestational diabetes mellitus (GDM) is a frequent occurrence in the second trimester of pregnancy, with the risk being greater with increasing age [11-13].

Auto immune diseases like insulin-dependent diabetesmellitus (IDDM), Hashimoto's thyroiditis, pernicious anemia, etc., are more common in women and occur concomitantly. An association between hypo thyroidism and different types of diabetes mellitus has been reported previously.

The present study was conducted to find out the prevalence of gestational diabetes, sub clinical hypo thyroidism and overt hypo thyroidism in pregnancy at our tertiary care hospital.

Aim and objectives

- To measure the levels of Serum levels of fasting blood glucose, one hour and two-hour blood glucose, TSH, FT3 and FT4 in antenatal women.
- To find out the prevalence of Gestational Diabetes, Sub clinical and overt Hypothyroidism in pregnancy.
- To measure the levels of anti-TPO antibodies all pregnant women.

Materials and methods

This cross-sectional study was conducted in the Department of Biochemistry, in collaboration with the Department of Obstetrics and Gynecology, and 100 eligible pregnant women coming for their first antenatal checkup (ANC) were enrolled in the study.

Study design

Prospective hospital-based study.

Sample size

100 cases of antenatal mothers were included.

Inclusion Criteria

Apparently healthy pregnant women, both primigravida and multi-gravida, with singleton pregnancies in their first ANC were included and written informed consent was obtained from the enrolled cases.

Exclusion Criteria

Pregnant women with preexisting thyroid diseases or any other endocrine disorders, pre-existing diabetes, on any hormone replacement therapy, any other metabolic or chronic disorders, and bad obstetric history with a known cause were excluded from the study.

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Data collection

Detailed history was taken regarding the symptoms of thyroid disorders, menstrual history, obstetric history, past medical history, family history, personal and social history.

General examination was done. Body temperature, pulse rate, blood pressure, respiratory rate was noted. Systemic examination of the cardiovascular system (CVS), central nervous system (CNS), respiratory system and thyroid gland was done. Per abdominal and per vaginal examination was done and findings were recorded.

Blood Sample Collection and Bio chemical Investigations

Basic hematological and biochemical investigations were carried out along with thyroid function tests (TSH, FT3, FT4, anti TPO antibody titers). All the patients were subjected to first trimester ultrasound scan to confirm gestational age less than 12 weeks. The reference interval for thyroid panel were as per ATA guidelines. After general and gynecological examination, fasting, one-hour, and two-hour blood samples were collected for 75 g OGTT. Thyroid profiles were done by the chemiluminescence method.

For this study, the trimester-specific upper limit value for TSH was taken as <2.5 mIU/mL for the first trimester and <3 mIU/mL for the second and third trimesters as per American Thyroid Association (ATA)2011 criteria. Patients with TSH levels higher than the trimester specific level and normal fT4 levels were diagnosed with SCH. Anti-TPO level <60 U/L was taken as normal upper limit as per manufacturer's protocol. Level more than 60U/L is considered a raised anti-TPO titer. GDM was diagnosed using 75 g of glucose challenge test (GCT) with a fasting value of more than 92 mg/dl, one-hour post-glucose value of more than 180 mg/dl, and a two-hour post-glucose value of more than 153mg/Dl. d

Results

This cross-sectional study was conducted in the Department of Biochemistry, in collaboration with the Department of Obstetrics and Gynecology, and 100 eligible pregnant women coming for their first antenatal checkup (ANC) were enrolled in the study.

Table 1: Shows baseline characteristics of the study patients

Parameters	Mean ± SD
Age	26.10± 3.99
Gestational age	8.41 ± 2.98
FBS	74.17 ± 8.92
2-hour Glucose	104.13 ± 24.09
TSH	2.25±1.59
FT3	2.3± 0.90
FT4	1.48± 0.47

Table 2: Shows the number and percentage of various thyroid disorders in the study population

Parameters	Number	Percent
Euthyroid	64	64%
Overt hypothyroidism	8	8%
Subclinical hyperthyroidism	2	2%
Subclinical hypothyroidism	26	26%
Total	100	100%
GDM	4	4%
Normoglycemia	96	96%

Table 3: Shows the Anti TPO antibody titres

Parameters	Number	>60 U/L	<60 U/L
Euthyroid	64	19 (29.6%)	45
Overt hypothyroidism	8	5 (62.5%)	3
Subclinical hypothyroidism	26	18 (69.2%)	8

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Fig 1:

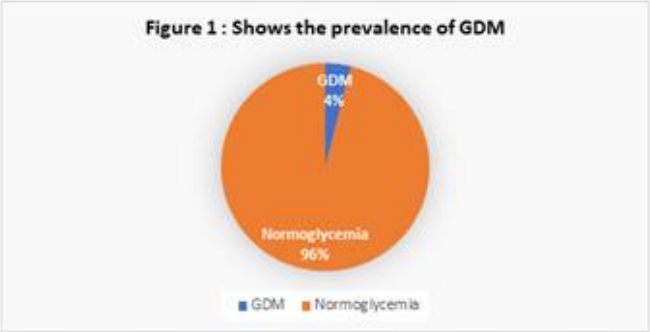
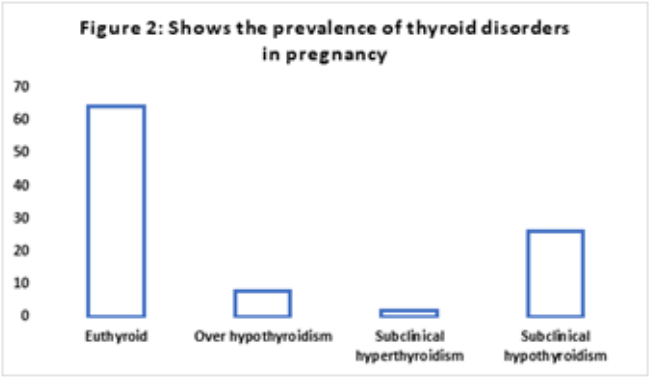


Fig 2:



Discussion

In the present study, we included 100 antenatal women based on inclusion and exclusion criteria. We measured thyroid function tests to calculate and study the prevalence of subclinical hypo thyroidism and overt hypo thyroidism in pregnant women. We found the prevalence of 4% GDM in pregnant women, 8% overt hypo thyroidism and 26% sub clinical hypo thyroidism. Further we evaluated for anti TPO antibodies, we found that the titres were elevated (>60 U/L) in 29.6% euthyroid pregnant women, 62.5% of overt hypo thyroidism pregnant women and 69.2% of subclinical hypo thyroidism pregnant women.

Primary maternal hypothyroidism is characterized by an increase in the serum TSH levels during pregnancy. It is further classified as subclinical hypo thyroidism (SCH) which has normal free T4 levels and overt hypo thyroidism (OH) which has decreased free T4 levels. This differentiation is crucial as it has clinical and management implications.

Maternal complications reported to be associated with overt hypo thyroidism include pre-eclampsia, placental abruption, polyhydramnios, oligohydramnios, hyperemesis, gestational diabetes, premature rupture of membranes, and chronic hypertension. For the fetus too, there is a high risk of fetal death, prematurity, low birth weight, congenital malformations, foetal distress, perinatal hypoxic encephalopathy, and deficit in the mental developmental coefficient. Some epidemiological studies have also pointed towards the association of maternal hypothyroidism and adverse neurological outcomes in the progeny ranging from neurological cretinism, congenital hypothyroidism, to decreased intelligence quotient [14, 15].

The prevalence of SCH in pregnancy differs extensively worldwide. In India, the prevalence of SCH varies from 2.8% to 32.94% in different parts of the country, as documented in various studies. Gayathri et al. reported the prevalence of SCH of 2.8% among pregnant women in Chennai and 57.1% of the subclinical hypothyroid patients had positive TPO antibodies. Aggarwal et al. documented the prevalence of SCH to be 10.9% among pregnant women in a study conducted in a premier institute in north India, and TPO antibody positivity was 59% among the subclinical hypo thyroid pregnant women in their study [16-19].

In our study, we documented a comparatively higher prevalence of subclinical hypothyroidism, which is quite high compared to other studies but almost in accordance with Mandal et al. as we used ATA 2011 criteria with an upper limit of TSH of 2.5 mIU/L in the first trimester and 3 mIU/L in the second and third trimesters. The prevalence of GDM in India, as per current statistics,

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varies from 4% to 18%. Literature also shows the prevalence rate is higher in urban areas than in rural areas. Our study population was heterogenous in geographical and social distribution.

Conclusion

This present study revealed an increase in subclinical hypothyroidism in pregnancy in our population. A significant number of SCH with high anti-TPO antibody titer points towards auto immunity as being a significant cause of the decreased level of thyroid hormones in pregnancy. However, GDM prevalence was at par with the national figure but with no significant association of SCH, and a high anti-TPO ab titer was found with GDM in our study.

We declare no financial support (self-funding) and nil conflict of interest.

Limitations

The sample size in our study was less, larger sample size is needed to support our findings.

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