



ORIGINAL RESEARCH PAPER

Obstetrics & Gynaecology

THE INTERPLAY: HYPOTHYROIDISM'S IMPACT ON GESTATIONAL DIABETES MELLITUS

KEY WORDS:
 Hypothyroidism, gestational, diabetes mellitus, antibodies, antenatal

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ABSTRACT	Background: The association between thyroid disorders and gestational diabetes mellitus has gained attention in maternal health research. Thyroid hormones, crucial for overall metabolic regulation, might play a role in insulin resistance, a key factor in GDM. Further exploration of this relationship can guide clinicians in developing targeted interventions and monitoring strategies for pregnant individuals at risk for both thyroid disorders and GDM. Methodology: This study was conducted with 100 antenatal women out of which 50 patients were with Hypothyroidism and 50 patients had normal thyroid. These patients were followed up and Oral glucose tolerance test was done as per the WHO protocol between 24-28 weeks period of gestation. Result: In our study it was observed that 12 (24%) out of 50 hypothyroid women developed GDM while 4 (8%) out of 50 normal women developed GDM, the difference being statistically significant (p value 0.029). Moreover it was seen that 8 (36%) out of 22 women with Anti-TPO Ab positivity developed GDM while 8 (10%) out of 28 women with Anti-TPO Ab negativity developed GDM, the difference being statistically significant (p value 0.032). Conclusion: This study shows a positive correlation of GDM with Hypothyroidism in pregnancy, along with a strong association with anti-TPO antibodies.
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INTRODUCTION There is considerable physiological impact on thyroid gland and its metabolic function in pregnancy. To meet up with increased metabolic needs during normal pregnancy, thyroid gland increase in size by nearly 40%, along with increase in production of T3 (triiodothyronine) and T4 (Thyroxine), Increase in Thyroxine binding globulin (TBG) and increase in hCG (human chorionic gonadotropin) hormone during the 1st trimester of pregnancy stimulates TSH (thyroid stimulating hormone), due to their structural similarity¹. This stimulation leads to higher T3 and T4 levels, whereas TSH tends to decrease¹. Between T3 and T4, T4 is a prohormone and serves as a substrate for biologically active form T3. 80% of T3 is produced from the peripheral conversion of T4 to T3 by deiodinase enzyme and rest 20% is produced from thyroid gland itself. Growing foetus depends on maternal thyroid hormones in 1st trimester for its growth and development and any alteration results in adverse perinatal and obstetric outcomes like pregnancy loss, premature delivery, IUGR, gestational hypertension etc. Incidence of hypothyroidism in pregnancy in Indian population is attributed to nutritional as well as immunological origins. Anti-thyroperoxidase (anti-TPO) antibody has the ability to cross placenta and affects foetal growth². Euthyroid women with TPO antibodies are at increased risk of developing subclinical hypothyroidism in first trimester and thyroiditis in postpartum period³. These women are at an increased risk of fetal loss, preterm delivery, perinatal mortality and large for gestational age infants^{3,4}. Thyroid hormones influence glucose metabolism by affecting the production and utilization of glucose. Hypothyroidism may disrupt this balance, leading to abnormal glucose metabolism and an increased risk of GDM. In India, one of the most populous country globally, rates of GDM are estimated to be 10- 14.3% which is much higher than the west⁵. The incidence of GDM is expected to increase to 20% i.e. one in every 5 pregnant women is likely to have GDM⁶. Higher FT4 concentrations were found to protect against GDM in a large retrospective study of 27,513 Chinese women⁷; however, two studies in the US did not identify any significant associations^{7,8}.	In this study, we aim to investigate the associations of thyroid function indicators (T3,T4,TSH, and Anti-TPO Ab) with the occurrence of GDM in pregnant women. MATERIALS AND METHODS STUDY DESIGN: This cohort study was carried out in Department of Obstetrics & Gynaecology at Mata Gujri Memorial medical college and Lions seva Kendra hospital, Kishanganj over a period of 1 year i.e July 2022 to July 2023. All Antenatal patients attending OPD were screened for Thyroid abnormalities (T3, T4, TSH & Anti-TPO Antibody) in first trimester along with routine antenatal investigations including fasting and post prandial blood sugar). TSH ≥ 4 is taken as the cut-off for hypothyroidism. Our study included 100 antenatal women out of which 50 patients with Hypothyroidism were put in Group A and 50 patients with normal thyroid values are put in group B. These patients were followed up and Oral glucose tolerance test was done as per the WHO protocol between 24-28 weeks period of gestation. As a routine procedure after an overnight fasting of minimum 8 hours, venous plasma values for fasting, 1 hour and 2 hour after 75 gm glucose were taken. Fasting value between 92-125 mg/dl and 2 hours post prandial value between 153- 199 mg/dl after 75 gm glucose were considered normal. Inclusion Criteria 1. All ANC patients 2. All patients with hypothyroidism 3. Patients with BMI between 18.5 to 29.9 4. No metabolic abnormalities 5. Willing to participate Exclusion criteria 1. Overt Diabetes mellitus 2. Pre-gestational Diabetes mellitus 3. Hyperthyroidism 4. Obesity 5. Past history of Gestational Diabetes mellitus 6. Dyslipidaemia
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7. Age > 35 years
8. Hypertension
9. Multiple gestation
10. Family history of Diabetes mellitus

RESULTS

AGE	GROUP A	GROUP B	p VALUE
	28.42 ± 4.28	27.36 ± 5.44	0.28 NS
PARITY	GROUP A	GROUP B	p VALUE
PRIMI	21	23	0.16 NS
MULTI	29	27	
BMI	GROUP A	GROUP B	p VALUE
NORMAL (18.5-24.9)	32	36	0.39 NS
OVERWEIGHT (25-29.9)	18	14	
	GROUP A	GROUP B	p VALUE
GDM	12	4	0.029 S
NORMAL	38	46	
	ANTI TPO POSITIVE	ANTI TPO NEGATIVE	p VALUE
GDM	8	8	0.032 S
NORMAL	14	70	

In our study the overall incidence of GDM was found to be 16%. The difference in age, parity & BMI between the two groups was found to be statistically insignificant.

The average age of patients in Group A was 28.42 ± 4.28 years while that of Group B was 27.36 ± 5.44 years, the difference being insignificant (p value 0.28).

In Group A, there were 21 primigravida and 29 multigravida while in Group B there were 23 primigravida and 27 multigravida, the difference being insignificant (p value 0.16).

In Group A 32 patients had normal BMI and 18 patients were overweight while in Group B 34 patients had normal BMI and 16 patients were overweight, the difference being insignificant (p value 0.39).

We observed that 12 (24%) out of 50 hypothyroid women developed GDM while 4 (8%) out of 50 normal women developed GDM, the difference being statistically significant (p value 0.029).

It was observed that 8 (36%) out of 22 women with Anti-TPO Ab positivity developed GDM while 8 (10%) out of 78 women with Anti-TPO Ab negativity developed GDM, the difference being statistically significant (p value 0.032)

DISCUSSION

In this study GDM patients had significantly higher TSH levels and Anti-TPO Ab. Hypothyroidism is known as an insulin resistant condition. Studies have demonstrated that 6-24% of patients with type 1 DM and 3-6% of patients with type 2 DM suffer from hypothyroidism, while 1-2% of diabetic patients present with hyperthyroidism⁸. In pregnancy, blood glucose are influenced by hormones like hCG, estrogen, TBG, placenta derived insulin and placental lactogen. They can be changed by alteration in thyroid hormone levels. Studies have demonstrated that autoimmune mechanisms could play a role in the development of GDM in some patients¹⁰. It is also seen that diabetes related antibodies may be present in some patients with GDM, which poses a predisposition to other autoimmune disorders such as thyroid autoimmunity. In our study immune status of GDM was not evaluated and is one of the weakness of the study.

CONCLUSION

This study shows a positive correlation of GDM with Hypothyroidism in pregnancy, along with a strong association with anti-TPO antibodies. The observed association between Anti-TPO antibody positivity and GDM raises intriguing

questions about the potential mechanistic links between thyroid autoimmunity and glucose metabolism during pregnancy. Future research endeavors should focus on unraveling the underlying pathways to guide preventive strategies and targeted interventions.

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