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The Association Between Maternal Hypothyroidism And Gestational Diabetes Mellitus – A Dual Endocrinopathy And Its Impact On Maternal And Neonatal Outcomes

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Abstract

Background: Gestational diabetes mellitus (GDM) and maternal hypothyroidism are two common endocrine disorders during pregnancy, both associated with adverse maternal and neonatal outcomes. Their coexistence may amplify risks, but evidence regarding dual endocrinopathy remains limited, particularly in the Indian population.

Aim: To assess the impact of coexisting gestational diabetes mellitus and hypothyroidism on maternal and neonatal outcomes compared to GDM alone.

Methods: A single-centre retrospective cross-sectional study was conducted in the Department of OBG at SLIMS in Puducherry, including 50 women with both GDM and hypothyroidism (cases) and 50 women with GDM alone (controls). GDM was diagnosed using the DIPSI protocol (2-hour plasma glucose ≥140 mg/dL after 75g glucose intake), and hypothyroidism was defined as TSH >4 µIU/mL. Maternal and neonatal outcomes were compared between the two groups.

Results: A significantly higher proportion of women with dual endocrinopathy were aged >30 years (p=0.01) and delivered macrosomic infants (>3.5 kg, p=0.007). Although not statistically significant, the dual group required insulin therapy more frequently and had higher rates of previous abortions and neonatal respiratory distress. No significant differences were observed in preterm birth, mode of delivery, preeclampsia, fetal distress, or perinatal complications between the groups.

Conclusion: The coexistence of hypothyroidism and GDM is associated with increased maternal age and higher incidence of macrosomia. These women should be considered high-risk pregnancies, warranting early detection, close monitoring, and integrated management. Routine screening for thyroid dysfunction in women with GDM, particularly those >30 years, may improve maternal and perinatal outcomes.

Keywords: Gestational diabetes mellitus, Hypothyroidism, Dual endocrinopathy, Pregnancy outcomes, Maternal complications, Neonatal complications.

Introduction:

Recent research indicates that the prevalence of gestational diabetes mellitus (GDM) ranges between 5% and 18%. GDM is a well-recognized condition that significantly contributes to both maternal and fetal complications.

Maternal complications associated with GDM include damage to end organs, increased susceptibility to preeclampsia, chorioamnionitis, polyhydramnios, premature labor, urinary tract infections, and a higher likelihood of requiring caesarean section or instrumental delivery. Postpartum risks such as hemorrhage, wound infections, and sepsis are also elevated. Over the long term, women with GDM are at a higher risk of developing type 2 diabetes mellitus, as well as cardiovascular and renal diseases.
Fetal complications linked to GDM encompass congenital anomalies, excessive birth weight (macrosomia), growth restrictions, sudden intrauterine fetal demise (IUFD), chronic oxygen deprivation, shoulder dystocia, birth asphyxia, and various biochemical disturbances after birth, including respiratory distress syndrome (RDS). Long-term concerns include increased risk for obesity, type 2 diabetes mellitus, cardiovascular diseases, and cognitive or motor developmental delays.

Maternal hypothyroidism, on the other hand, affects approximately 2 to 12 out of every 1,000 pregnancies. If the thyroid gland fails to meet the increased hormonal demands during pregnancy, it may manifest clinical symptoms similar to overt hypothyroidism. Thyroxine produced by the mother plays a crucial role in fetal brain development, particularly during the first trimester—until around the 12th week of gestation—when the fetus becomes capable of producing its own thyroid hormones. Even after this period, maternal thyroxine continues to be essential for normal fetal growth and neurological development.

Research has established a correlation between hypothyroidism during pregnancy and an increased risk of developing GDM. Some previous studies have also suggested that the coexistence of these two endocrine disorders—GDM and hypothyroidism—could potentially worsen fetal outcomes. This highlights the need for further studies examining the individual and combined impact of these endocrinopathies during pregnancy. The goal is to enhance screening methods and establish standardized management protocols.

In light of this, our study aims to evaluate the maternal and fetal outcomes in cases of gestational diabetes mellitus with coexistinghypothyroidism, compared to outcomes in cases with GDM alone. We focus on understanding the effects of these two prevalent endocrine disorders in the Indian population.

Aim

To assess the adverse effects of the dual endocrinopathy, gestational diabetes and hypothyroidism on maternal and neonatal outcomes.

Materials and Methods

Study Design: It is a single centre based retrospective cross-sectional study.
Sample Size: 50 cases and 50 controls were included.

Criteria:

Inclusion Criteria:

Patient with both gestational diabetes mellitus and hypothyroidism as cases. Patients with gestational diabetes mellitus alone as controls.

A TSH level of more than 4uIU/mL was considered as the cutoff value.

Screening according to DIPSI protocol after 75g glucose intake was done to diagnose gestational diabetes mellitus, with a cut-off blood sugar level of 140 mg/dl after 2 hours.

Exclusion criteria:

Overt diabetics
Congenital hypothyroidism
Patients having other significant medical comorbidities.

Result:

Statistically insignificant

- Preterm birth (p=0.37)
- Conception on infertility treatment
- History of abortions (p=0.1)
- Doppler changes
- PROM
- Malpresentation
- Need for LSCS
- Development of PIH (p=0.28)
- Postnatal respiratory distress
- Operative vaginal delivery
- Fetal hypoxia

Statistically significant

- Age more than 30 yrs (p=0.01)
- Baby weight > 3.5kg (p=0.007)

	Gestational Diabetes alone	Gest. DM + Hypothyroidism
Age (more than 30 yrs)	5	16
Need for Insulin therapy	16	22
Birthweight > 3.5kgs	6	18
Preterm births	8	5
Conception on infertility treatment	6	5
History of abortions	5	11
Doppler changes	8	8
PROM	7	6
History of GDM in prev. pregnancy	4	10

	Gestational Diabetes alone	Gest. DM + Hypothyroidism
Malpresentations	8	9
History of hypothyroidism in prev. pregnancy	0	2
Need for LSCS	38	40
De-novo HTN in this pregnancy	18	19
Operative vaginal delivery	4	2

Respiratory distress in baby	**14**	**19**
Non reassuring FHR	**12**	**14**
Abruption	**0**	**1**

Age has been identified as an important factor associated with the occurrence of coexisting gestational diabetes mellitus and hypothyroidism. Although the difference was not statistically significant, patients with hypothyroidism tended to require insulin therapy more frequently. This could potentially explain the statistically significant increase in the incidence of macrosomia observed in this group, compared to those with GDM alone.

Interestingly, and in contrast to earlier research, our findings did not show a significant increase in the rates of cesarean delivery, preterm labor, abnormal fetal heart rate patterns, doppler flow abnormalities, preeclampsia, or neonatal respiratory distress syndrome (RDS) among patients with both conditions.

Discussion:

According to the American College of Obstetricians and Gynecologists (ACOG), gestational diabetes mellitus (GDM) is defined as any level of glucose intolerance that either begins or is first recognized during pregnancy. This definition includes both women whose glucose levels return to normal after childbirth and those who go on to develop type 2 diabetes later in life.

The 2017 guidelines from the American Thyroid Association recommend using pregnancy-specific and population-based reference ranges for thyroid function. If such data is unavailable or not applicable to the population , the guidelines suggest using an upper reference limit that is 0.5 microIU/mL lower than the non-pregnant upper limit. Alternatively, a fixed upper limit of 4 microIU/mL may be used, consistent with findings from large-scale studies in iodine-sufficient populations. [1]

Feely and Isles (1979) reported that the prevalence of overt hypothyroidism among diabetic patients was 2.7%, while subclinical hypothyroidism was seen in about 30% of cases. [2]

Research by T. Dan (2013) demonstrated that the coexistence of both diabetes and thyroid dysfunction represents an independent risk factor for the development of preeclampsia and an increased likelihood of cesarean delivery. [3]

Earlier studies have shown a significant positive correlation between thyroid-stimulating hormone (TSH) levels and blood glucose, along with an inverse relationship with fetal birth weight. [4] However, in our study, fetal weights were observed to be higher in patients diagnosed with hypothyroidism.

Additionally, other research has identified this dual endocrine disorder as a standalone risk factor for polyhydramnios. [5] In contrast, our findings did not support a similar association.

Conclusion:

The results of our study highlight the importance of being cautious about hypothyroidism in pregnant women with gestational diabetes, particularly those over the age of 30. This research underscores the need for heightened awareness regarding the early detection and management of hypothyroidism in women diagnosed with gestational diabetes mellitus. Both of these endocrine conditions are common and can often be effectively managed through appropriate dietary interventions.

There is a clear necessity for comprehensive screening of one disorder when the other is present, especially in patients older than 30 years. Our findings also emphasize that these individuals should be closely monitored, categorized as high-risk pregnancies, and managed proactively due to the increased likelihood of maternal and perinatal complications.

Given the limited existing research in this area, further studies are essential to deepen our understanding and improve clinical management strategies.

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