

Maternal and Fetal Outcome in Dual Gestational Endocrinopathy

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Abstract

Background: Hypothyroidism and diabetes are the endocrine disorders commonly observed in pregnancy and each has been associated with adverse maternal and foetal outcomes. As there is a very high prevalence of hypothyroidism among GDM patients, this study is aimed at determining the prevalence of hypothyroidism among GDM patients and the maternal outcome and fetal outcome in pregnant women with dual endocrinopathy.

Aims and Objectives:

1. To determine the proportion of hypothyroidism in pregnant with gestational diabetes mellitus.
2. To assess the maternal and foetal outcome in antenatal patients with gestational diabetes mellitus and hypothyroidism.

Methodology: This is a descriptive study conducted in department of OBG, ESIC-PGIMSR Bangalore between January 2020 to June 2020. All women attending antenatal OPD with gestational diabetes mellitus and thyroid dysfunction are followed up, and the maternal and foetal outcome evaluated.

Results: In our study the prevalence of hypothyroidism in patients with GDM is found to be 37.5%. Dual endocrinopathy is associated with increased risk of preeclampsia (27.3%) and risk for cesarean section (64.4%) and increased neonatal morbidity.

Conclusion: There is a high prevalence of hypothyroidism among patients with GDM and the dual endocrinopathy is associated with adverse maternal and foetal outcome. Hence pregnant women diagnosed with one of these endocrinopathies should be screened for the other.

Keywords: Gestational Diabetes Mellitus; Thyroid Dysfunction; Dual Endocrinopathy; Preeclampsia; Foetal Outcome; Caesarean Section

Introduction

Diabetes mellitus and hypothyroidism are among the most common endocrine disorders observed during pregnancy. Gestational diabetes mellitus is defined as carbohydrate intolerance of variable severity with onset or first recognition during pregnancy. The prevalence of GDM varies between 1 - 14%. About 3 - 5% of pregnancies are complicated by diabetes, 90% are GDM and the rest being pre gestational.

Hypothyroidism is a condition in which the thyroid gland fails to produce a sufficient amount of thyroid hormone to meet the metabolic demands of the body. About 10 - 15% of pregnant women have thyroid dysfunction during the first half of pregnancy, which may be hypothyroidism or hyperthyroidism [2]. However, the prevalence of thyroid dysfunction in pregnant women with type 1 diabetes is about three times more than general population and subclinical hypothyroidism is more prevalent.

The prevalence of thyroid diseases in diabetic patients is found to be 10.8 to 13.4% and highest among Type 1 diabetic patients. Pregnancy confers a state of Insulin resistance, which increases during the second and initial part of third trimester. There is a state of diabetogenic stress in the latter half of pregnancy due to interplay of various factors such as high levels of counter-regulatory hormones like human placental lactogen, Progesterone, cortisol, prolactin, as well as decreased hepatic glucose uptake, and decreased post-prandial insulin secretion.

Thyroid disorder in type 1 DM patients is found in about 10% and it manifests as increase thyroid autoantibody and subclinical hypothyroidism in 30% females.

Hypothyroidism appeared to negatively affect glucose homeostasis by inducing insulin resistance and thus have an increased risk of gestational diabetes. There is reduced glucose absorption from gastrointestinal tract accompanied by prolonged peripheral glucose accumulation, gluconeogenesis, diminished hepatic glucose output and reduced disposal of glucose in patients with hypothyroidism.

Both the endocrinopathies have been found to be associated with adverse Feto-maternal outcomes.

GDM and pre GDM are associated with a host of adverse maternal outcomes like pre-eclampsia, polyhydramnios, shoulder dystocia, birth trauma, increased caesarean section rates, perinatal and neonatal mortality and morbidity like - birth defects, metabolic complications, respiratory distress syndrome and prematurity.

Pregnant women with hypothyroidism have been found to have a increased rate of abortions in first trimester, placental abruption, gestational hypertension and post-partum haemorrhage.

Purpose of the Study

The purpose of this study is to evaluate the prevalence of thyroid dysfunction in women with gestational diabetes and its associated maternal and foetal outcome.

Aims and Objectives

1. To determine the proportion of hypothyroidism in pregnant women with gestational diabetes mellitus.
2. To assess the maternal and foetal outcome in pregnant women with gestational diabetes mellitus and hypothyroidism.

Materials and Methods

- A descriptive observational study.
- Department of Obstetrics and Gynaecology at ESIC-PGIMS, Rajajinagar, Bengaluru.
- From January 2020 to June 2020

- In Patients attending Antenatal OPD, a detailed history will obtained with relevance to age, period of gestation, complaints related to diabetes mellitus, its onset and duration are noted. Thorough clinical examination including general examination and antenatal examination will be done. All routine investigations - blood group and Rh typing, serology, CBC, urine routine and microscopy, OGTT and thyroid function tests are done. In Patients diagnosed with gestational diabetes mellitus the proportion of thyroid dysfunction is determined. The patents with both GDM and thyroid dysfunction are taken. These patients are followed up till delivery and the maternal and foetal outcome is noted.
- Maternal outcome - gestational hypertension and preeclampsia, preterm labour, placental abruption, hydramnios, mode of delivery.
- Foetal outcome - macrosomia, low birth weight, Apgar score, need for NICU care, shoulder dystocia, birth defects, perinatal and neo-natal morbidity and mortality.

Inclusion criteria:

1. All women attending antenatal OPD diagnosed with gestational diabetes mellitus and thyroid dysfunction.
2. All women giving written informed consent for the study.
3. All women who agree to follow up at our institution.

Exclusion criteria

Women with multifetal gestation, medical complications other than DM and hypothyroidism, previous thyroid surgeries and structural fetal anomalies were excluded from the study.

Criteria for diagnosis of gestational diabetes mellitus with 75 gms OGTT (WHO criteria).

	In pregnancy
2hr ≥ 200 mg/dl	Overt Diabetes
2hr ≥ 140 mg/dl	GDM
2hr ≥120mg/dl	Impaired GTT

Table A

Thyroid hormone level

First trimester	< 2.5 mIU/L
Second trimester	< 3 mIU/L
Third trimester	< 3 mIU/L

Table B

Procedure

Screening for GDM, for all pregnant women and high-risk patients who tested negative in early pregnancy, should be performed between 24 and 28 weeks of gestation by a 75g of OGTT, with fasting plasma glucose measurement at 1 and 2 hours, in these not previously diagnosed with overt diabetes. It is better to perform OGTT in the morning after an overnight fast of at least 8 hours. GDM is diagnosis when any of the following plasma glucose values are exceeded: Fasting: ≥ 92 mg/dL (5.1 mmol/L); 1h: ≥ 180 mg/dL (10.0 mmol/L); 2h: ≥ 153 mg/dL (8.5 mmol/L).

Sample size

An estimated 2000 antenatal mothers are screened in a year at ESIC HOSPITAL (department of OBGY) of which 120 patients are found to be gestational diabetes mellitus. As per the previous literature an estimated 3 - 5% are found to have thyroid dysfunction among gestational diabetes patients. With this tend to detect at least 45 gestational diabetic patients with thyroid dysfunction. hence the sample size of our study is 120.

Data analysis

Data were entered into Microsoft Excel and statistical analysis was carried out in SPSS software version 24.0. Qualitative variables were presented as frequency and percentages. Quantitative variables were presented as mean (standard deviation) or median (range) depending upon the distribution of data. Bar diagram and pie charts were used for graphical representation of data.

Results and Observations

A total of 120 women were included in the study. Out of which about 75 (62.5%) women had only diabetes while 45 (37.5%) women had both diabetes and hypothyroidism.

The most common age group of the study subjects was between 26 - 30 years -51 (42.5%). Multiparous women accounted the highest 69 cases (57.5%).

Age group (years)	Frequency	Percentage
< 25	27	22.5
26 - 30	51	42.5
31 - 35	35	29.2
> 35	7	5.8

Table 1: Distribution of age group among study subjects.

Parity	Frequency	Percentage
Primi	51	42.5
Multi	69	57.5

Table 2: Distribution of gravida among study subjects.

> 36 weeks is the most common gestational age among the study subjects about 87 cases (72.5%).

Gestational Age (weeks)	Frequency	Percentage
< 32	3	2.5
32 - 36	30	25.0
> 36	87	72.5

Table 3: Distribution study subjects based on gestational age.

In patients of GDM with hypothyroidism, 60.00% had previous history of diabetes mellitus.

The rate of gestational hypertension and preeclampsia was higher in the dual endocrinopathy group, 27.3% and 17.7% respectively. About 6% cases developed hydramnios, the highest rate was noted among the dual endocrinopathy group. Also, the rate of preterm deliveries was significantly high in women with dual endocrinopathy.

	Diabetes		Dual endocrinopathy	
	No.	%	No.	%
GHTN	8	10.5	12	27.3
Preeclampsia	4	5.33	8	17.7
Oligohydramnios	3	3.9	1	2.3
Polyhydramnios	1	1.3	2	4.5
Preterm	10	13.3	15	20
Anaemia	0	0	1	2.3
Infections	10	13.3	12	27.3
Macrosomia	18	24	11	24.4
Nil	59	77.6	27	61.4

Table 4: Distribution of co morbidities among study subjects.

	Frequency	Percentage
LSCS	78	65
Normal	42	35

Table 5: Distribution of mode of delivery among study subjects.

Indication	Diabetes alone		Dual endocrinopathy	
	No. of cases	%	No of cases	%
Breech in labor	4	5.2	1	2.2
Previous LSCS in labor	13	17.1	13	29.5
Foetal distress	5	6.5	16	34.1
CPD in labor	5	6.5	4	9.1
Failed induction	12	15.7	8	18.1
Fetal macrosomia	0	0	2	4.5
Preeclampsia	4	5.2	0	0
Placenta Previa	1	1.3	1	2.2
PPROM	2	2.6	0	0
IUGR	3	3.9	0	0

Table 6: Distribution of patients based on indication for LSCS.

In patients of GDM with hypothyroidism, 20% gave birth to babies with birth weight less than 2.5 kg. 20% of the newborns, born to mothers with GDM and hypothyroidism had NICU admission.

Discussion

Diabetes mellitus and hypothyroidism are the two most common endocrinopathies during pregnancy. Both of them have been found to be associated with adverse maternal and foetal outcomes. GDM is associated with increased risk hypothyroidism among pregnant women. This study is done to find out the adverse outcome when dual endocrinopathies are present.

The prevalence of hypothyroidism amongst patients with GDM is found to be 37.5%. In Heena Parveen., *et al.* study the prevalence is 33.3% which is comparable to our study. Feely and Isles have reported a prevalence of 2.7% of overt hypothyroidism in diabetic patients and up to 30% for subclinical hypothyroidism [10]. Other studies reported a prevalence of 10.8 - 13.4% of thyroid diseases in diabetic patients.

In our study, most common age group amongst patients with GDM is between 26 to 30 years (48.80%). In Tirosh., *et al.* [1] study the mean age group for patients with GDM and with dual endocrinopathy was found to be 28 to 38 years. In Amudha P., *et al.* [13] the mean age was found to be 22 to 32 years.

In our study, amongst patients of GDM and hypothyroidism, 62.2% were multiparous and 37.7% are primiparous. In Tirosh., *et al.* study [1], 56.6% of the patients with GDM and hypothyroidism are multiparous.

In our study, the most common comorbidity seen is hypertensive disorders in pregnancy in both the patients with GDM as well as in patients with GDM and hypothyroidism. But the association is more in dual endocrinopathy than with GDM alone.

The comorbidities which are seen in the patients with hypothyroidism and GDM are gestational hypertension which accounts for 27.3%, polyhydramnios 4.5%, oligohydramnios and anaemia account for 2.3% each.

Many authors have reported a higher rate of hypertensive disorders in pregnancy in women with both hypothyroidism and in woman with GDM than the general population. The combination of GDM and hypothyroidism is associated with a higher rate of hypertensive disorders of pregnancy [5].

The prevalence of hypertension among women with hypothyroidism in pregnancy range between 11 - 44%. The risk of developing hypertensive disorders was found to be 1.5 times greater among women with GDM and the risk for eclampsia 1.8 times greater than other pregnant women [6]. The presence of microvascular complications might be increasing the risk for preeclampsia and its co-morbidities. Insulin resistance may lead to the development of hypertensive disorders during pregnancy. The dual endocrinopathy further increased the risk of development of preeclampsia. The mechanism involved is complex. Many studies have reported that disorders, such as hypertriglyceridemia are positively associated with preeclampsia. Both GDM and hypothyroidism are related to elevated plasma triglycerides concentrations. Endothelial dysfunction might also lead to the development of preeclampsia. In patients with hypothyroidism, there is impaired blood flow in response to the tissue schema suggesting endothelial dysfunction in these patients. Thus, hypothyroidism may enhance the risk of development of preeclampsia [12].

In our study, amongst patients with GDM, 52.5% have previous history of diabetes and in patients with GDM and hypothyroidism, 60.00% had previous history of diabetes mellitus.

In our study, 65% of GDM patients underwent LSCS, 35% had vaginal delivery. In patients of GDM with hypothyroidism, 64.4% delivered by LSCS and 35.5% had normal vaginal delivery. Most common indications for LSCS were previous LSCS, failed induction, CPD in labour constitute, foetal macrosomia, breech presentation and placenta previa.

Dual endocrinopathy is an independent risk factor for cesarean section. The indications for the cesarean deliveries were non-emergency in majority. Both GDM and hypothyroidism are associated each with an increased risk for LSCS. According to the previous studies, patients with GDM have an increased rate of cesarean section (23 - 35%). Sahu., *et al.* [11] and Cohen., *et al.* reported a high prevalence of 44 - 52% cesarean sections in a small group of patients with hypothyroidism. These reports are in line with our study.

In our study, dual endocrinopathy is associated with adverse fetal outcome. Fetal distress is more common in hypothyroid patients. A 20% of mothers with GDM and hypothyroidism gave birth to babies with birth weight less than 2.5 kg. The APGAR score at 5 minutes after birth for the newborns found that, 75.8% were moderately depressed with APGAR score of 4 to 6. 20% of the newborns born to pregnant women with GDM and hypothyroidism were admitted in NICU.

In several studies adverse perinatal outcome has been documented in mothers with dual endocrinopathy. Yang., *et al.* [9], Tiros., *et al.* [1] have reported an increased risk for preterm delivery. The adverse perinatal outcome is mainly due to the adverse maternal outcome related to dual endocrinopathy.

Conclusion

The combined endocrinopathy is associated with increased adverse maternal and fetal outcome, especially there is increased risk of infertility, abortions, preterm births, preeclampsia, abruption and increased rates of caesarean section. This emphasizes the importance of screening for the other endocrinopathy when one is present. Hence there is a need for closer surveillance in women with dual endocrinopathy for better outcome.

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