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Original Research Article

Associated Risk Factors and Pregnancy Outcome among Women with Gestational Diabetes Mellitus

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Abstract

Introduction: Gestational diabetes mellitus (GDM) is characterised by variable degrees of glucose intolerance with onset or initial detection during pregnancy. GDM is a major public health concern in India.

Materials and methods: This case control study was carried out among 50 antenatal women with GDM and 50 antenatal women without GDM. Fasting blood glucose was measured after which they were given 75 g oral glucose and plasma glucose was estimated at 2 h. Patients with plasma glucose >140 mg/dl were labeled as GDM. Thus WHO criteria were used for diagnosing GDM. Data was collected from all subjects on family history of Diabetes and hypertension, BMI, etc., and pregnancy outcomes were studied.

Results: Gestational diabetes mellitus was found to be significantly associated with age, and BMI. The most common complication observed among GDM was gestational HTN followed by PROM and vaginal candidiasis. Still birth and NICU admission was observed more in GDM than in non GDM.

Conclusion: GDM adversely affects maternal and fetal outcomes. Appropriate interventions are required for its control.

Keywords: Gestational diabetes mellitus, Complications, WHO OGTT

Introduction

The maternal metabolic adaptation maintains the mean fasting plasma glucose of 74.5±11 mg/dl and the post-prandial peak of 108.7±16.9 mg/dl. [1] The fine-

tuning of glycaemic level during pregnancy is possible due to compensatory hyperinsulinemia, as normal pregnancy is characterized by insulin resistance. Gestational diabetes mellitus (GDM) is characterized by carbohydrate intolerance of varying severity with onset or first recognition during pregnancy. A pregnant woman who cannot increase her insulin secretion to overcome insulin resistance during normal pregnancy develops gestational Diabetes. [2] A major challenge in evaluating the evidence on GDM screening is the range of adverse maternal and neonatal outcomes associated with untreated GDM.

Furthermore, the importance of GDM is that two generations are at risk of developing Diabetes in the future. Although GDM is asymptomatic, the consequences may be substantial. The 2003 United States Preventive Services Task Force (USPSTF) evidence review suggested that hyperglycemia's impact on adverse maternal and fetal outcomes is probably continuous. [3] Before the discovery of insulin in 1921 by Frederic Banting and Charles Best, women with DM rarely became pregnant, and those who did experience a high incidence of maternal and fetal abnormality. Women with GDM have a greater incidence of preeclampsia, affecting 10-25% of all pregnant diabetics. There is also a higher incidence of chorioamnionitis and postpartum endometritis, postpartum bleeding due to uterine over-distension due to the macrosomic baby More women with GDM undergo cesarean sections and instrumental deliveries with more incidence of shoulder dystocia. The consequences of GDM to the fetus are more severe than those to the mother. Amongst the fetal effects, the frequency of congenital anomalies is increased in women with poorly controlled type 1 DM and the incidence of fetal macrosomia is increased in women with GDM and DM type 2. The fetus can get affected with various congenital anomalies (caudal regression syndrome, transposition of great vessels, VSD, ASD), hypoglycemia, hyperviscosity syndrome, hyaline membrane disease, macrosomia, hypocalcemia, apnoea, bradycardia, traumatic delivery, and perinatal death. Pregnancy adversely affects DM by causing rapid progression of diabetic nephropathy, diabetic retinopathy, and increased risk of death in patients with diabetic cardiomyopathy. GDM is a significant public health problem in India. In India, the Prevalence of GDM is steadily increasing from 2% in 1982 to 7.2% in 1991 and 16.5% in 2002. [4,5] The fact that GDM causes innumerable complications to the mother and the fetus and increases the future risk should alert physicians to the necessity to devote special attention to this population segment in developing countries. Timely action taken in screening all pregnant women for glucose tolerance, achieving euglycemia in them, and ensuring adequate nutrition may prevent, in all probability, the vicious cycle of transmitting glucose tolerance from one generation to another.

Objective

The aim was to determine the Prevalence of GDM, associated risk factors, and pregnancy outcomes.

Materials & Methods

Study design: Case control study

Study setting: The present study was conducted in the prenatal clinic in the Department of Obstetrics and Gynaecology at a tertiary care hospital.

Sample size: Case: 50 antenatal women with GDM and Control: 50 antenatal women without GDM

Inclusion criteria: Pregnant women at the 24th-28th week of gestation.

Exclusion criteria:

- All patients with h/o of DM prior to the commencement of pregnancy,
- Chronic severe disorders such cancer, TB, congestive cardiac failure (CCF), renal failure, and advanced liver failure

Study variables: A standardised questionnaire was used, and details about family history, medical and obstetric history were obtained. Body mass index (BMI) and blood pressure (BP) were recorded. Informed consent was taken from the patients.

Detailed plan : Pregnant women were administered a 75 g oral glucose load irrespective of their last meal timing and venous blood sample was taken at 2 h. The glucose oxidase-peroxidase (GOD-POD) method evaluated the plasma glucose in the central laboratory. Diagnosis of GDM The criterion utilized as if the 2 h venous plasma glucose measured after 75 g oral glucose load in non-fasting condition was 140 mg/dl (DIPSI criteria) the patient was designated as GDM. [6] The rest were classified as the normal glucose tolerant or the non-GDM group. GDM women were advised medical nutrition therapy (MNT) for 2 weeks. Those who did not respond by maintaining fasting plasma glucose (FPG) 90 mg/dl and peak post-meal glucose 120 mg/dl were advised insulin. All of them were followed till delivery. The women's pregnancy and postnatal course and the perinatal outcome were evaluated.

Statistical analysis: Results were reported as number and percentages. Chi-square test for proportions was performed for comparing GDM with Non-GDM. P value less than 0.05 were deemed to be significant.

Results

Table 1 : Comparison of risk factor prevalence in GDM and non-GDM patients

Risk factors	Non-GDM (n-50)	GDM (n-50)	p value
Age > 25 years	26 (52%)	38 (76%)	0.012
Family history of Diabetes Mellitus	4 (8%)	20 (40%)	0.00017
History of Perinatal loss	5 (10%)	7 (14%)	0.53
History of Big baby	1 (2%)	4 (8%)	0.16
Past History of GDM	1 (2%)	6 (12%)	0.05
BMI >25	12 (24%)	35 (70%)	0.000

More than 70% patients were observed to be more than 25 years having GDM. Association was seen between age and family history of DM among GDM.

Table 2: Distribution of associated complications between populations with and without GDM

Complications	Non-GDM (n-50)	GDM (n-50)	p value
Gestational HTN	6 (12%)	25 (50%)	0.02
Premature rupture of membrane	3 (6%)	15 (30%)	0.0001
Vaginal candidiasis	3 (6%)	13 (26%)	0.006
Abruptio placenta	1 (2%)	6 (12%)	0.056

The most common complication observed was gestational HTN among GDM, followed by PROM and vaginal candidiasis. Statistical difference was observed among these.

Table 3: Delivery outcomes in non-GDM and GDM patients

Outcome of delivery	Non-GDM (n-50)	GDM (n-50)	p value
Cesarean section (CS)	18 (36%)	40 (80%)	0.0001
Spontaneous vaginal delivery	31 (62%)	8 (16%)	0.0001
Assisted vaginal delivery	1 (2%)	2 (4%)	0.55
Shoulder dystocia	1 (2%)	2 (4%)	0.55
Postpartum hemmorrhage	8 (16%)	12 (24%)	0.31

Most common delivery observed in GDM was CS followed by vaginal delivery. Significant diffrence was observed in them. Postpartum hemmorrhage was observed more in GDM compared to non GDM. However, there no statistical difference seen.

Table 4: Fetal outcome in GDM and Non GDM patients.

Fetal outcome	Non-GDM (n-50)	GDM (n-50)	p value
NICU admission	12 (24%)	30 (60%)	0.0002
Still Birth	1 (2%)	10 (20%)	0.004
Hyperbilirubenemia	8 (16%)	14 (28%)	0.14
Hypoglycemia	7 (14%)	12 (24%)	0.20
Macrosomia	2 (4%)	7 (14%)	0.08

Still birth and NICU admission was observed more in GDM than in non GDM. Statistical difference was observed in them.

Table 5: Distribution of patient according to weight of the baby.

Weight of baby	Non-GDM (n-50)	GDM (n-50)	p value
Upto 3.5	10 (20%)	20 (40%)	0.02
3.5 or more	2 (4%)	6(12%)	0.14

Weight of baby up to 3.5 kg was observed to be high in GDM and association was seen in them. Weight of baby more than 3.5 kg was more in GDM compared to non GDM but no association was observed.

Discussion

GDM patients were older than non-GDM subjects, with mean ages of years and years for the two groups, respectively. Similar research from South India identified age 25 as a risk factor for GDM. [7] A significant proportion of patients (70%) with GDM in our study were overweight. The association observed between BMI and Gestational Diabetes was statistically significant. Several studies have found that overweight or obesity at the beginning of pregnancy predisposes to GDM, supporting the significance of obesity as a GDM risk factor. Das et al. and Gomez et al. found that 25% and 50% of women with GDM were obese. [8,9] This may result from increased demands on the maternal metabolism during pregnancy due to obesity, resulting in hormonal carbohydrate regulation mechanisms and insulin sensitivity imbalances. Nilofer et al., identified obesity as a risk factor in 88.89% of patients with type 2 diabetes. [10]

In the present study, 40% had family history of DM in patients with GDM. Statistically, a significant difference was observed with a family history of DM and GDM. A study on in Iran by Garshasbi et al., discovered identical results The familial association of GDM is supported by the possibility that the mothers of GDM-affected women also suffered from GDM in their pregnancies but were not diagnosed.[11]

According to our study, 14% of GDM mothers had a foetal or early neonatal death history. A similar study conducted in Iran on 227 patients by Hoseini et al., discovered that 12.3% of GDM women had a history of previous foetal or neonatal deaths. [12] Wahi et al. also discovered that 24.9% of their GDM patients had a family history of perinatal losses.[13] Insulin, a potent growth factor, stimulates lipogenesis, protein synthesis, and, consequently foetal growth. Consequently, a history of previous delivery of a large or macrosomic infant (birth weight 4 kg) indicates GDM in previous pregnancies. In our study, 8 percent of GDM women reported having previously delivered a large infant.

The most prevalent complication among GDM mothers, according to our study, was gestational hypertension (30%), followed by vaginal candidiasis (26%), premature membrane rupture (20%), and abruptio placentae (16%). Gajjar discovered that gestational hypertension was the most prevalent maternal complication in GDM mothers (36.4%), followed by abruptio placentae (20%).[14] Another study of 972 GDM mothers in Saudi Arabia revealed that perineal tears resulting in postpartum haemorrhage were the most common complication, followed by gestational hypertension. [15]

Gajjar discovered a C-section rate of 19.5% among GDM patients.[14] In our study, 40 GDM patients were delivered via caesarean section, with labour arrest being the most common indication. This is likely due labour arrest being the most typical symptom. Consequently, fewer high-risk patients undergo trial of labour, and more patients are delivered via Lower Segment Cesarean Section.

Our study revealed that 14% of newborns born to GDM mothers were macrosomic, compared to 4% of those born to non-GDM mothers. Hong et al. also discovered a 6.5% incidence of macrosomia within the GDM group. [16]

Our study revealed that the Prevalence of stillbirth in GDM deliveries was 20%. According to a study conducted by Odar in Uganda, the rate of stillbirth was 16.7%. [17] The incidence of hypoglycemia and hyperbilirubinemia was 14% and 24%, in Non GDM and GDM respectively, consistent with the Brazil-based case-control study hypoglycemia and hyperbilirubinemia findings 16.3% and 6.1%, respectively. [18,19]

Conclusion

Women with GDM are at increased risk for adverse obstetric and perinatal outcomes, and despite its unique geographic and socioeconomic characteristics, it is without exception. Although eradicating GDM is impossible, its negative effects on pregnancy outcomes can be prevented.

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