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A Study on Fetomaternal Outcome in Gestational Diabetes Mellitus in Tertiary Care Hospital: At SMGS Jammu

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Abstract

Background: Gestational Diabetes Mellitus (GDM) is defined as carbohydrate intolerance of variable degree with onset or first recognition during pregnancy. Indian women have a high prevalence of diabetes and increased risk of GDM and associated complications. The prevalence of GDM has increased over the past several decades.

Aim: The present study was undertaken to determine the maternal and fetal outcomes in GDM complicating pregnancy in a tertiary care hospital.

Methods: A retrospective study conducted for a period of one year from January, 2023 to December, 2023 in the Department of obstetrics & gynaecology, SMGS Hospital, Jammu in which 400 antenatal patients were studied. 200 antenatal patients beyond 22 weeks of gestation with deranged DIPSI levels and 200 antenatal patients beyond 22weeks with normal DIPSI were studied and compared.

Results: During the study period, 40% cases of GDM belonged to the age group >35years whereas 14% in the control group were >35years old. 55% of GDM cases were overweight and obese (BMI >25) whereas 35% in the control group were overweight and obese. 64% of GDM patients had family history of diabetes in Ist degree relative where 80% of patients in the control group had no family history. It is observed in this study, 57% of GDM cases underwent Cesarean delivery whereas in the control group, only 35% underwent caesarean. It was inferred that fetal complications like hypoglycemia (10%), RDS (15%), prematurity (35%), macrosomia (34%), still birth (16%), shoulder dystocia (11%) were more seen in GDM cases. Also, maternal complications like pre-eclampsia (21%), PPH (10%), polyhydramnios (13%), preterm labour (6%) and candiasis (21%) were more common in GDM complicating pregnancies.

Conclusion: In this study, feto-maternal complications and morbidity was significantly higher in patients with GDM.

Keywords: Diabetes In Pregnancy Study Group of India, Feto-Maternal, Gestational diabetes mellitus, Hypoglycemia, Hyperbillirubinemia, Polyhydroamnios, Respiratory distress syndrome.

Introduction

Gestational diabetes mellitus (GDM) is a condition in which carbohydrate intolerance develops or is first diagnosed during pregnancy. GDM is the most common medical complication and metabolic disorder of pregnancy.[1,2] The prevalence of GDM has increased over the past several decades. Depending on population sample and diagnostic criteria used, prevalence ranges from 1 to 20 per cent.[3] The aim of the present study is to evaluate the risk factors and feto-maternal outcome in mothers with Gestational diabetes mellitus.

Despite not meeting many of the criteria for a program of population-based screening,[4] screening for GDM has been accepted widely and is almost universally practiced among health care professionals in North America[5,6]. Methods for screening for GDM include:

1. Screening with a 1-hour 50-g glucose load (or alternative)
2. Risk factor based screening
3. One step testing with a diagnostic 2-hour 75-gram oral glucose tolerance test (OGTT). This does not in fact constitute a screening test but rather universal testing
4. Screening with alternative biochemical tests: Fasting plasma glucose (FPG); HbA_{1C}, random plasma glucose (RPG)

Currently, the diagnostic test for GDM recommended by the Diabetes in Pregnancy Study Group of India (DIPSI) is an evaluation of plasma glucose after two hours of ingestion of 75 g glucose load irrespective of meal timings. This has also been included in the guidelines issued by the Ministry of Health and Family Welfare, Government of India.[7]

The American Diabetes Association (ADA) had recommended a 2-step approach to identify GDM with an initial glucose challenge test (GCT) with 50 g glucose load followed by a diagnostic oral glucose tolerance test (OGTT) with 100 or 75 g glucose load.[8] According to the World Health Organization (WHO) criteria, GDM is diagnosed using 75 g OGTT with fasting plasma glucose value >126 mg/dl or two-hour >140 mg/d.[9]

After publication of results of the large, multicentric, international Hyperglycaemia and Pregnancy Outcome (HAPO) study[10], the International Association of Diabetes and Pregnancy Study Groups (IADPSG) recommended a single-step approach to the diagnosis of GDM in 2010. They recommended 75 g OGTT for all pregnant women and diagnosed GDM if one or more plasma venous glucose values exceeded the following thresholds: fasting >92 mg/dl, one hour ≥180.0 mg/dl, or two hour ≥153 mg/dl.[11] The WHO (2013)[12] and ADA (2014)[13] have accepted the IADPSG criteria, but this is not accepted by the American College of Obstetricians and Gynecologists (ACOG) who still continue to recommend two-stage testing for diagnosis.[14]

According to the ADA, WHO and IADPSG recommendations, patients are required to come to the antenatal clinic in the fasting state and subsequently undergo multiple blood sampling for testing. On the other hand, the DIPSI recommends a two-hour plasma glucose evaluation after the use of 75 g glucose load in non-fasting state irrespective of the timing of last meal [15] as a simple, economical and feasible single-step

procedure for the diagnosis of GDM. As per the recommendations of the DIPSI, GDM is diagnosed if the venous plasma glucose value exceeds 140 mg/dl. This test is claimed to serve both as a screening and a diagnostic procedure.[16]

Antepartum Management of Gestational Diabetes Mellitus

The benefits of treating GDM are now generally accepted.[17,18] There is also an association between the presence of GDM and hypertensive disorders of pregnancy.[19,20] The goals of treatment are: (1) optimizing fetal growth and preventing macrosomia, (2) reducing the risk of intrauterine fetal death, (3) reducing the risk of pre-eclampsia,[21] (4) reducing the risks of Caesarean section, and (5) reducing the risk of neonatal complications including shoulder dystocia, birth trauma and neonatal hypoglycemia.

Material & Method

It was a retrospective study conducted for a period of one year from January, 2023 to December, 2023 in the Department of Obstetrics & Gynaecology, SMGS Hospital, Jammu in which 400 antenatal patients were studied. 200 antenatal patients beyond 22 weeks of gestation with deranged DIPSI (Diabetes in Pregnancy Study Group of India) levels and 200 antenatal patients beyond 22weeks with normal DIPSI were studied and compared.

The outcomes evaluated were maternal outcomes including pre-eclampsia, Caesarean section, PPH, polyhydroamnios, preterm labour, IUGR, candidiasis; and fetal outcomes including congenital anomalies, stillbirth, macrosomia, hypoglycemia, RDS, hyperbilirubinemia etc.

Inclusion Criteria

Pregnant women > 22 weeks of gestation with blood sugar levels > 140mg/dl after 2 hours of 75g oral glucose (DIPSI).

Exclusion Criteria

Patients with chronic diabetes mellitus (before 22 weeks of gestation)

Statistical Analysis

The data was entered in MS excel 2007 Microsoft corporation publication and analyzed using Epi Info CDC Version 7.2.0.1. Statistical significance for continuous variables was tested using student t-test and discrete variables using CHI SQUARE test. Frequencies were described using percentages.

Results

A total of 400 patients were enrolled in the study based on inclusion and exclusion criteria. In this study, 150 (75%) GDM cases taken belonged to urban areas and 50 (25%) belonged to rural areas. The age range for mothers with gestational diabetes was 18–39 years with the mean age of 28.6 years. The controls were similar with the mean age of 27.8 years. 40% cases of GDM belonged to the age group >35years whereas 14% in the control group were >35years old. 44% patients in GDM group were multiparous (G3 or more) whereas 20% in control group were multiparous. 55% of GDM cases were overweight and obese (BMI >25) whereas 35% in the control group were overweight and obese. 64% of GDM patients had family history of diabetes in Ist degree relative where 80% of patients in the control group had no family history. Thus, in this study a positive correlation was seen in GDM mothers to increasing age, multiparty, increasing BMI and positive family history. The following tables illustrate the demographic variables and body weight distribution of

women with GDM complicating pregnancy and the control groups. (Table 1, 2, 3 & 4)

Table 1: Distribution of cases & control according to place

Place	Cases (%, GDM Cases)	Controls (%, Non-GDM Cases)
Urban	75%(150)	35%(70)
Rural	25%(50)	65%(130)

Table 2: Distribution of cases and controls according to age

Age	Cases (%, GDM Cases)	Controls (%, Non-GDM Cases)
<25years	12%(24)	24%(48)
25-29years	24%(48)	34%(68)
30-34years	24%(48)	28%(56)
>35years	40%(80)	14%(28)

Table 3: Distribution of cases and controls on the basis of effect of parity

Parity	Cases (%, GDM Cases)	Controls (%, Non-GDM Cases)
Primigravida	20%	42%
G2	36%	38%
G3 or more	44%	20%

Table 4: Distribution of cases & control according to BMI

BMI	Cases (%, GDM Cases)	Controls (%, Non-GDM Cases)
<18.5	15%(30)	15%(30)
18.5-24.9	30%(60)	50%(100)
25-29.2	40%(80)	25%(50)
>30	15%(30)	10%(20)

Table 5: Distribution of cases & control according to Family history

Family history	Cases (GDM %)	Controls (Non-GDM %)
Yes	64%	36%
No	20%	80%

It is observed in this study, 57% of GDM cases underwent Cesarean delivery whereas in the control group, only 35% underwent caesarean and 65% delivered vaginally. Out of 114 LSCS performed on

GDM complicating pregnancies, previous LSCS was most common indication (17.93%) followed by Fetal distress (13.59%), colour Doppler changes (9.24%), macrosmia (6.52%) whereas out of 70 LSCS performed in non GDM group, 10.33% cases were because of colour Doppler changes, 7.07% were previous LSCS and 5.97% cases were performed because of Fetal distress. 13.04% LSCS in GDM group and 10.87% LSCS in non GDM control group were performed due to other reasons like bad obstetrics history, non progression of labour, malpresentations, eclampsia etc. Table 6 and 7 shows mode of delivery distribution and indication of LSCS in cases and control groups.

Table 6: Distribution of cases & control according to mode of delivery

Mode of Delivery	Cases (%, GDM cases)	Controls (%, Non-GDM cases)
C-section	57% (114)	35% (70)
Vaginal	43% (86)	65% (130)

Table 7: Indications of Cesarean section in mothers with gestational

Indications Total lscs 184	GDM cases, Percentage (114 lscs, 61.95%)	Non GDM controls, Percentage (70lscs, 38.04%)
Previous LSCS	33 (17.93%)	13(7.07%)
Macrosomia (EFW >4.5kg)	12 (6.52%)	4 (2.17%)
Fetal Distress	25 (13.59%)	11 (5.97%)
Obstructed Labour	2 (1.09%)	1 (0.54%)
Colour Doppler Changes	17 (9.24%)	19 (10.33%)
Placenta Previa	1 (0.54%)	2 (1.09%)
Others (BOH, NPOL,CPD, Breech, Eclampsia Etc)	24 (13.04%)	20 (10.87%)

In this study, 36 babies (18%) born to GDM weighed > 4 kg whereas 24 babies (12%) were macrosomic in the control group (table 8).

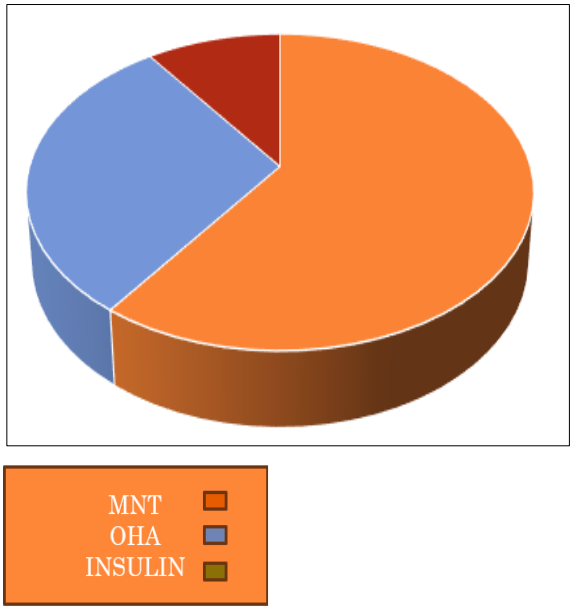
Table 8: Distribution of cases and controls birth weight of child

Birth Weight	Cases (%, GDM cases)	Controls (%, Non-GDM cases)
<2.5 kg	17%(34)	34%(68)
2.5-4 kg	65%(130)	54%(108)
>4 kg	18%(36)	12%(24)

It is inferred from table 9 and graph 1, that 60% patients in the GDM group were on diet control, 30% were controlled on oral hypoglycemic drugs and only 10% were in human insulin injections. Some patients with uncontrolled sugar levels on diet control or Oral hypoglycaemic drugs were started insulin therapy during the course in hospital. Association of glycemic control and fetomaternal outcomes were not studied.

Table 9: Graph 1 Treatment plan for GDM patients

Treatment plan	Cases (GDM,%)
Diet plan (MNT)	60
Oral hyoglycemic drugs	30
Insulin	10



From table 10 and 12, it was inferred that fetal complications like hypoglycemia (10%), RDS (15%), prematurity (35%), macrosomia (34%), still birth (16%), shoulder dystocia (11%) were more seen in GDM cases. Also, maternal complications like pre-eclampsia (21%), PPH (10%), polyhydramnios (13%), preterm labour (6%) and candiasis (21%) were more common in GDM complicating pregnancies. Instrumental delivery, Apgar score at birth, NICU admissions, other infections and complications like diabetic ketoacidosis, ICU admissions were not considered in the study.

Table 10: Distribution of cases according to fetal and neonatal complications

Fetal and neonatal complications	GDM cases, Percentage	Non GDM control, Percentage
Hypoglycemia	20 (10%)	0%
Hyperbilirubinemia	20 (10%)	28 (14%)

RDS	30 (15%)	8 (4%)
Prematurity	70 (35%)	24 (12%)
Macrosomia	68 (34%)	6 (3%)
IUD/still birth	32 (16%)	6 (3%)
Congenital malformation	6 (3%)	2 (1%)
cot death	2 (1%)	0%
shoulder dystocia	22 (11%)	2 (1%)

Table 11: Distribution of cases according to maternal complications

Maternal complications	GDM cases, Percentage	Non GDM controls, Percentage
Pre-eclampsia/ gestation HTN	42 (21%)	14 (7%)
PPH	20 (10%)	4 (2%)
Polyhydroamnios	26 (13%)	4 (2%)
IUGR	6 (3%)	2 (1%)
Preterm labour	12 (6%)	0%
Candidiasis	42 (21%)	8 (4%)
Abortion	0%	0%

Discussion

In the present study, GDM was seen to be associated with mothers of elder age group, overweight and obesity, and those with family history of GDM which was also seen in studies by Dudhwadkar and Fonseca., 2016; Shukla A et a., 2017; Katke, Rajshree.,2021. [22,23,24]

Also, maternal complications like pre-eclampsia (21%), PPH (10%), polyhydramnios (13%), preterm labour (6%) and candiasis (21%) were more common in GDM complicating pregnancies. In this study, pre-eclampsia/gestational hypertension was most common maternal complications seen in 21% GDM cases which was comparable to 27.32% in Singla et al., 2016 and 26% in Dudhwad- kar and Fonseca., 2016. [22,25] But in Katke, Rajshree.,2021, polyhydramnios was the most common complication of GDM, seen in 28% of GDM mothers.[24] In this study, 57% of GDM cases underwent Cesarean delivery whereas in the control group, only 35% underwent caesarean and 65% delivered vaginally. According to P. Kanaka Mahalakshmi et al.,2020 and Katke, Rajshree.,2021 incidence of delivery by Cesarean Section 81% and 60% in GDM mothers respectively.[26,24]

It is observed in this study that out of 114 LSCS performed on GDM complicating pregnancies, previous LSCS was the most common indication (17.93%) followed by fetal distress (13.59%). The most common indication was fetal distress (47.65%) followed by big baby in P. Kanaka Mahalakshmi et al.,2020.[26]

In this study, 36 babies (18%) born to GDM weighed > 4 kg whereas 24 babies (12%) were macrosomic in the

control group. In Katke, Rajshree.,2021, 36% of babies born to GDM weighed > 4 kg and in P. Kanaka Mahalakshmi et al.,2020, macrosomia was seen in 26.7% of cases.[24,26]

It was inferred in this study that fetal complications like prematurity (35%), macrosomia (34%), still birth (16%), RDS (15%), shoulder dystocia (11%), hypoglycemia (10%) were more seen in GDM cases. According to P. Kanaka Mahalakshmi et al.,2020, hypoglycemia was seen in 25.6% of babies of GDM and it was the most common cause of NICU admissions. Respiratory distress was seen in 14.7% of cases. [26]

Thus, the feto-maternal morbidity was significantly higher in patients with GDM in this study which was also seen in many studies in our references.

Conclusion & Recommendations

All the antenatal women should be offered a simple Glucose challenge test. There was significant feto-maternal morbidity in patients with gestational diabetes mellitus. Once diagnosed with GDM proper glycemic control either by insulin or diet plan to achieve a good pregnancy outcome. Early detection and prompt management of this condition can reduce the short and long term complications in both mother and neonate. Educating patients about regular antenatal care and early detection by screening and timely intervention is necessary for a better feto-maternal outcome.

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