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Original Research Article

## Clinical study of fetomaternal outcomes in cases of gestational diabetes mellitus

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### ABSTRACT

**Background:** To study of prevalence of gestational diabetes mellitus in the community, demographic parameters like age, gestational age at diagnosis, parity, complications related to gestational diabetes mellitus, and plan the management of gestational diabetes mellitus and to reduce the maternal and perinatal morbidity and mortality.

**Methods:** In this prospective observational study we included 50 patients with gestational diabetes mellitus were studied for fetomaternal outcome. The study was conducted from October 2018 to October 2020 at department of Obstetrics & Gynaecology, B. J. Medical college and Civil Hospital, Ahmedabad.

**Results:** Total 50 cases of gestational diabetes mellitus were studied. It was observed that gestational diabetes mellitus were more common in elderly age group (60%), multigravida patients were more commonly involved (48%). Past history of gestational diabetes mellitus was present in 42.2% of cases, 74% of cases required insulin for glycemic control, 64% cases required delivery by caesarean section, maternal complications like preeclampsia (10 cases), polyhydramnios (22), uteroplacental insufficiency (4), macrosomia, sudden intrauterine death (3) and operative delivery were more common. 6 neonates developed respiratory distress syndrome, 10 developed hypoglycemia, and 13 neonates required NICU admission, 6 neonates underwent perinatal mortality.

**Conclusions:** Gestational diabetes mellitus has become a global public health burden. Gestational Diabetes Mellitus is one of the leading causes of morbidity and mortality for both mother and infant worldwide. Early detection of gestational diabetes mellitus, timely referral, frequent antenatal visits, management of the identified cases at tertiary centres can lead to decreased maternal and fetal morbidity and mortality.

**Keywords:** Gestational diabetes mellitus, Demographic parameters, Glycemic control, Maternal and fetal complications associated with gestational diabetes mellitus

### INTRODUCTION

Gestational diabetes mellitus (GDM) is defined as "carbohydrate/glucose intolerance of varying degrees of severity with onset or first recognition during pregnancy" irrespective of treatment with diet or insulin.<sup>1</sup> Women with gestational diabetes are individuals with a genetic or metabolic predisposition towards diabetes who are

incapable of compensating for the diabetogenic effects of pregnancy.

Pregnancy is a diabetogenic state. Glucose intolerance and gestational diabetes mellitus result when pancreatic beta-cell function cannot adequately compensate for the degree of insulin resistance in pregnancy. Metabolic plasticity (adaptation) during pregnancy protects the fetus during periods of limited maternal resources.

Gestational diabetes mellitus is defined as carbohydrate intolerance of varying severity, with onset or first recognition during pregnancy. It does not require whether there is a requirement of insulin and whether or not it disappears after the pregnancy. It excludes patients with previously diagnosed diabetes. Pregnancy is usually accompanied by progressive insulin resistance beginning from near mid-pregnancy and progresses through third trimester. The insulin resistance arises from a combination of increased maternal adiposity and insulin desensitizing effects of placental hormones. Insulin resistance develops because of; production of human placental lactogen, Increased production of cortisol, estriol, progesterone, increased insulin destruction by kidney and placenta

### ***Increased lipolysis***

Changes of gluconeogenesis; fetus preferentially utilizes alanine & other amino acids depriving the mother of major gluconeogenic source.

### ***Risk factors for gestational diabetes mellitus***

Women at the greatest risk of developing GDM are those who are obese, multigravida older than 25 years, have previous history of abnormal glucose metabolism or poor obstetric outcome, have first degree relatives with diabetes, or are members of ethnic groups with high prevalence of diabetes. These ethnic groups are Hispanics, African, American, Mexican, south-east Asians. As regards to age and BMI and an increased risk of GDM, several studies have demonstrated that women with GDM were older than 27 years of age and had a significantly higher pre pregnancy BMI than women without GDM. Other modifiable risk factors for GDM include lack of exercise and dietary fat as well as lifestyle habits such as smoking and certain drug abuse. GDM recurs at the rate of 30 to 50% in the subsequent pregnancy. Factors associated with recurrence include obesity, weight gain between pregnancies, and higher fat intake.<sup>2</sup>

### ***New 2015 NICE guidelines suggestions***

Women who have had gestational diabetes in a previous pregnancy should be advised for early self-monitoring of blood glucose or a 75 g 2-hour OGTT as soon as possible after booking (whether in the first or second trimester), and further 75 g 2-hour OGTT should be repeated at 24-28 weeks if the results of the first OGTT are normal, Offer women with any of the other risk factors for gestational diabetes a 75 g 2-hour OGTT at 24-28 weeks.

### ***Aim and objectives***

Aim and objectives of current study were to study the prevalence of gestational diabetes mellitus, study demographic characteristics like age, parity, BMI, Past history in relation to GDM and to study the maternal

outcome in terms of mode of delivery, intrapartum and post-partum complications and fetal outcome in terms of maturity, birth weight, presence of congenital anomalies, and neonatal complications in cases of gestational diabetes.

## **METHODS**

Current study design was prospective observational study in which total 50 patients were studied during the period of October 2018 to October 2020 in department of obstetrics and gynaecology B. J. medical college and civil hospital Ahmedabad. All the antenatal cases having gestational diabetes mellitus either previously diagnosed or diagnosed at OPD during antenatal visits were analysed. Among them 32 patients were already diagnosed of GDM at some private centre and referred to civil hospital while 18 patients were diagnosed at civil hospital Ahmedabad during antenatal visits by screening method of DIPSI (diabetes in pregnancy study group of India). History was taken general physical and systemic examination and systemic examination was done. Antenatal complications and mode of delivery with operative interference, perinatal morbidity and mortality was associated with the cases were noted.

### ***Inclusion criteria***

Inclusion criteria for current study were pregnant women diagnosed of gestational diabetes mellitus first time during pregnancy irrespective of gestational age were included. All the booked cases or encountered in emergency were included in study. Patients who could be followed up, investigated and those in which fetal outcome could be recorded were only included.

### ***Exclusion criteria***

Patients with pregestational or overt diabetes were excluded from the study.

### ***Statistical analysis***

Data gathered of all 50 patients were analysed using Microsoft Excel Software and results are presented as frequencies, numbers or percentages and descriptive statistics.

## **RESULTS**

Out of total 15843 deliveries during October 2018 to October 2020, total 50 patients of gestational diabetes were studied. The prevalence of gestational diabetes mellitus in the present study was found to be 0.31%. In the present study, 2% patients of gestational diabetes belonged to age less than 20 year, 34% patients belonged to age group 20-29 years (Table 1). The maximum number of patients, that is, 60% were in the age group of 30-39 years. And 4% were in the age group of more than 40 years. It is observed in the present study 10% of

patients of gestational diabetes mellitus were diagnosed in first trimester, 32% in second and 48% in third trimester (Table 2). Thus, even if screening test is negative, re-screening for gestational diabetes should be done at 28 weeks again.

**Table 1: Age distribution of the patients in gestational diabetes mellitus (n=50).**

Age (years)	N	%
<20	1	2
20-29	17	34
30-39	30	60
>40	2	4

**Table 2: Distribution according to gestational age at which GDM is diagnosed (n=50).**

Trimester	N	%
First	10	20
Second	16	32
Third	24	48

In the present study, 10% patients were primigravida, 16% patients were second gravida, 26% patients were third gravida, 48% patients were fourth gravida (Table 3).

**Table 3: Distribution according to gravida status of the patients (n=50).**

Gravida	N	%
Primi	5	10
Second	8	16
Third	13	26
Four and above	24	48

It was observed that gestational diabetes mellitus was more frequent in multipara patients, hence parity is an important risk factor for development of gestational diabetes mellitus. Out of all 45 multigravida patients 42.2% patients had past history of gestational diabetes and 57.7% patients were not having past history of diabetes (Table 4). Thus, past history of GDM is a risk factor for recurrence of gestational diabetes mellitus in next pregnancy.

**Table 4: Distribution of cases according to the past history of gestational diabetes mellitus in multigravida patients (n=45).**

Past h/o GDM	Multigravida	%
Present	19	42.2
Absent	26	57.7

In the present study out of 50 patients of the gestational diabetes mellitus 13 patients were managed alone with the dietary control with life style modification and exercise (Table 5). All registered patients had followed up diet and exercise as advised. 37 patients of gestational

diabetes mellitus were not maintaining euglycemia with life style modification and exercise with dietary control, they were managed by insulin. In the present study it was observed that, 28% patients were delivered normally, 8% patients required instrumental vaginal delivery (Table 6). 48% patients delivered by emergency caesarean section; 8% patients underwent elective caesarean section.

**Table 5: Mode of management of the patients with the gestational diabetes mellitus (n=50).**

Management	N	%
Life style modification and exercise	13	26
Insulin	37	74

**Table 6: Mode of delivery in cases of gestational diabetes mellitus (n=50).**

Mode of delivery	N	%
Vaginal delivery	Normal	14 28
	Instrumental	4 8
Caesarean delivery	Emergency	24 48
	Elective	8 16

In the present study it was observed that most common indications for caesarean section in patients with gestational diabetes mellitus were previous 1 or more CS which includes 12 cases, 4 cases were having cephalopelvic disproportion, 5 cases were having induction failure and 5 cases were of fetal distress, 5 cases had uncontrolled GDM (Table 7).

**Table 7: Indications of caesarean section in gestational diabetes mellitus (n=50).**

Indications	N
Previous CS (1/2/3)	12
CPD	4
Fetal distress	5
Uteroplacental insufficiency	4
Uncontrolled GDM	5
Induction failure	5
PROM+ severe oligo	1

Incidence cannot be calculated from the above table due to overlapping of the indications of the caesarean section in a single patient. In the present study, most common association of gestational diabetes mellitus in pregnancy is PIH that is 10 cases developed preeclampsia and 4 cases had uteroplacental insufficiency, and 22 cases had abnormality in amniotic fluid (polyhydramnios), 3 patients developed septicemia, 1 patient had wound gap after caesarean section, 3 patients had intra uterine fetal death, 1 patient developed diabetic ketoacidosis, 5 cases underwent pre term labor, 3 of them developed hypoglycaemia (Table 8). In our study perinatal mortality was observed in 6 cases of gestational diabetes mellitus. Respiratory distress was present in 6 babies who required

supplemental oxygen or positive pressure ventilation 13 neonates were required NICU management.

**Table 8: Maternal complications in gestational diabetes mellitus.**

Maternal complications	N
Preeclampsia	10
Uteroplacental insufficiency	4
Polyhydramnios	22
Preterm labour	5
Post-partum haemorrhage	3
Septicaemia	3
Diabetic ketoacidosis	1
Wound gap	1
Intrauterine fetal death	3
Maternal hypoglycaemia	3

**Table 9: Neonatal complications of gestational diabetes mellitus.**

Neonatal complication	N
Prematurity	5
Macrosomia	3
Respiratory distress syndrome	6
Hypoglycaemia	10
Hyperbilirubinemia	8
Congenital anomaly	4
NICU admission >24 hours	13
Perinatal mortality	6

## DISCUSSION

According to the American diabetes association (ADA), GDM complicates approximately 7% of all pregnancies, whereas its total incidence is estimated up to 17.8% depending upon the ethnic and clinical characteristics of the population and diagnostic tests employed. Some women with gestational diabetes mellitus have previously unrecognized overt diabetes which is identified first time during pregnancy.

IADPSG has reported prevalence of GDM 27% Proportion of GDM in present study was less, probably because universal screening was not feasible due to certain constraints, or probably because of improvement in medical and obstetric facility at secondary level, a smaller number of patients were referred to tertiary care hospital.<sup>2</sup> In a study by Rowaily et al prevalence of GDM was 28.3% in age group of >30 years which was comparable to the present study in which incidence of gestational diabetes mellitus was 60% in age group of 30-39 years.<sup>3</sup> Study was compared to study of Thomas et al and it was observed that incidence of gestational diabetes mellitus was 47.7% in primi patients and 50.3% in multipara in a study by Thomas et al.<sup>4</sup> In the study by Jindal et al caesarean section was required in 44% cases of gestational diabetes mellitus and in the present study incidence of caesarean section was 64%. Most common

complications observed were preeclampsia, uteroplacental insufficiency, polyhydramnios, post-partum hemorrhage, septicemia sudden intrauterine fetal death. In the present study incidence of polyhydramnios was 44% in cases of gestational diabetes mellitus and it was comparable with the study by Jindal et al in which 44% women with GDM had polyhydramnios.<sup>5</sup> Women with GDM are at increased risk both for delivering an excessively grown infant and for having that delivery complicated by macrosomia and shoulder dystocia. When shoulder dystocia occurs, infants of mothers with diabetes are more likely to suffer brachial plexus injury than infants of nondiabetic women. However, the best strategy for avoiding this outcome is a controversial topic, usually centred on the use of caesarean delivery to prevent difficult vaginal birth and thus injury to the infant. Although brachial plexus injury after caesarean delivery has been described, it is an exceedingly rare event.<sup>6</sup> The presence of GDM is not by itself an indication for caesarean delivery. GDM is not an indication for delivery before 38 weeks of gestation in the absence of evidence of fetal compromise. Babies of diabetic mothers are prone to respiratory distress due to increased risk of preterm delivery and also due to late maturation of type-II alveolar cells. Fetal hyperinsulinemia antagonizes the action of cortisol causing blunted production of surfactant.<sup>7-9</sup> Study by Nigam et al showed incidence of hyperbilirubinemia in 14.2% newborns, macrosomia was found in 14.2% neonates.<sup>7</sup> In our study Macrosomia noted in 6% neonates, hyperbilirubinemia was present in 16% neonates, the study was comparable to the observations of Wahi et al and Bener et al where macrosomia was seen in 16.2%, and 10.3% respectively and in this study 6% IUD were noted compared to 6% in Nigam et al.<sup>10,11</sup>

## Limitations

Prevalence of the gestational diabetes mellitus is very less in the present study because less number of patients were referred to our tertiary care centre from the peripheral health centres due to unawareness of the gestational diabetes mellitus and its complications, limited duration of study period, infrequent visits of the non-compliant patients and due to social dilemma.

## CONCLUSION

Gestational diabetes mellitus is one of the common medical disorders encountered in pregnancy. Clinical recognition of gestational diabetes mellitus is important because timely intervention by dietary measures and/or insulin can reduce the well-known maternal and fetal complications associated with it. Patients with risk factors should be identified as early as possible and classified as a high-risk group and called for frequent antenatal check-up as required. Higher rate of maternal complications like gestational hypertension, polyhydramnios, preterm labor, intrauterine fetal death, wound gap, septicaemia was found in cases of gestational diabetes mellitus in our

study. Rate of caesarean sections was higher in the patients were gestational diabetes mellitus. Neonates born to gestational diabetes mellitus mothers had increased rate of macrosomia and metabolic complications which can lead to increase in perinatal morbidity and mortality rates. But immediate intensive care after birth lead to reduced neonatal mortality. Educating patients about regular antenatal care and proper screening of blood glucose levels in each trimester is important measures to reduce maternal and perinatal morbidity and mortality related to gestational diabetes mellitus. Universal screening and a team approach comprising of an obstetrician, diabetologist, anaesthetist, physician and neonatologist is the cornerstone in management of gestational diabetes mellitus. The importance of gestational diabetes mellitus is that the two generations, mother and baby, are at risk of developing diabetes in future. They are the ideal group to be targeted for lifestyle modification to delay the onset of overt diabetes.

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