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Original Research Article

A study of feto-maternal outcome in cases of gestational diabetes mellitus

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ABSTRACT

Background: The aim of the study was to determine prevalence of gestational diabetes mellitus in the community, demographic parameters like 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. The objective of this study was to evaluate the risk factors and fetomaternal outcome in mothers with gestational diabetes mellitus.
Methods: In this prospective cross sectional study we included 120 patients with gestational diabetes mellitus were studied for fetomaternal outcome. The study was conducted from January 2021 to June 2022 at department of obstetrics and gynecology, B. J. Medical College and Civil Hospital, Ahmedabad.
Results: Total 120 cases of gestational diabetes mellitus were studied. It was observed that gestational diabetes mellitus were more common in elderly age group (54.16%), multigravida patients were most commonly involved (48.33%). Past history of gestational diabetes mellitus was present in 39.81% of cases, 68.34% of cases required insulin for glycemic control, 63.34% cases required delivery by Caesarean section, maternal complications like preeclampsia (20 cases), polyhydroamnious (44), uteroplacental insufficiency (10), macrosomia, sudden IUFD (7) and operative delivery were common outcome. 12 neonates developed respiratory distress syndrome, 17 developed hypoglycemia and 26 neonates required NICU admission, 12 neonates underwent perinatal mortality.
Conclusions: Gestational diabetes mellitus has become a global public health burden. Early detection of gestational diabetes mellitus, timely referral, frequent antenatal visits, and management of the identified cases at tertiary care centers can lead to decreased maternal and feral morbidity and mortality.

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

INTRODUCTION

Gestational Diabetes Mellitus is defined as "carbohydrate intolerance of variable severity with first onset or recognition during the present pregnancy" irrespective of treatment with diet or insulin. It excludes patients with previously diagnosed diabetes.[1] The potential candidates for GDM are: (a) positive family history of diabetes; (b) having a previous birth of an overweight baby of 4 kg or more; (c) previous still birth with pancreatic islet hyperplasia revealed on autopsy; (d) unexplained perinatal loss; (e) presence of polyhydroamnios or recurrent vaginal candidiasis in present pregnancy; (f) obesity; and (g) age over 30 years. Pregnancy is a diabetogenic state characterized by hyperinsulinemia and decreased sensitivity to insulin at cellular levels. 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. 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. The peak effects of these hormones is seen in the 26th to the 33rd week of gestation. The incidence of DM in pregnancy is expected to increase to 20%. Approximately 8% of all pregnancies are complicated by GDM. The prevalence may range from 1 to 14% of all pregnancies depending on the population studied and the diagnostic tests used. Increasing levels of plasma glucose are associated with birth weight above the 90th percentile, primary caesarean deliveries, neonatal hypoglycaemia.

Increased lipolysis

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

Maternal and fetal complications

Maternal complications were (a) antepartum: abortion, preeclampsia, infection, polyhydroamnios, obesity, macrosomic baby; (b) intrapartum: prolonged labour due to big baby, shoulder dystocia, PPH, increased incidence of caeserean section; (c) postpartum: puerperal sepsis, increased maternal morbidity, diabetic retinopathy, diabetic nephropathy, diabetic ketoacidosis. Fetal complications likely to develop are macrosomia, IUD, malformations includes anencephaly, spina bifida, transposition of great vessels, VSD, renal agenesis, caudal regression syndrome, RDS, hypoglycemia, hypothermia, hyperbillirubinemia, hypocalcemia.

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

The aim and objectives of the 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 120 patients were studied during the period of January 2021 to June 2022 in department of obstetrics and gynaecology B. J. Medical College and Civil Hospital Ahmedabad. Their detailed data was obtained and their age, obstetric history, gestational age, past history of DM, mode of delivery, outcome of pregnancy, fetal weight, maternal and fetal complications and requirement of oral hypoglycaemic agents or Insulin were taken into consideration for the study. A retrospective analysis was made based on these parameters.

Inclusion criteria

Pregnant women >22 weeks of gestation with blood sugar levels 140-200 mg/dl after 2 hours of 75 g oral glucose (DIPSI). 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 120 patients were analysed using Microsoft Excel Software and results are presented as frequencies, numbers or percentages and descriptive statistics.

RESULTS

Out of total 9859 deliveries during January 2021 to June 2022, total 120 patients of gestational diabetes were studied. The prevalence of gestational diabetes mellitus in the present study was found to be 1.2%. IADPSG has reported prevalence of pregnancy with diabetes as 27%.[5] Proportion of patients with diabetic pregnancy 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.[2] In the present study, 5.8% patients of gestational diabetes belonged to age less than 20 year, 32.5% patients belonged to age group 20-29 years (Table 1). The maximum number of patients, that is, 54.2% were in the age group of 30-39 years. And 7.5% were in the age group of more than 40 years. It is observed in the present study 20% of patients of gestational diabetes mellitus were diagnosed in first trimester, 31.77% in second and 48.33% in third trimester (Table 2). Thus, even if screening test is negative, re-screening for gestational

diabetes should be done at 28 weeks again. In the present study, 10% patients were primigravida, 15.83% patients were second gravida, 25.83% patients were third gravida, 48.33% patients were forth gravida (Table 3). 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 108 multigravida patients 39.81% patients had past history of gestational diabetes and 60.19% 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. In the present study of total 120 cases of GDM, 15.83% patients were under weight, 22.5% patients had normal BMI, 27.5% patients were overweight and 34.17% were obese. Hence, 61.6% patients had BMI more than normal, which is a risk factor for development of GDM (Table 5).

In the present study out of 120 patients of the gestational diabetes mellitus 21 patients were managed alone with the dietary control with life style modification and exercise (Table 6). All registered patients had followed up diet and exercise as advised. 99 patients of gestational diabetes mellitus were not maintaining euglycemia with life style modification and exercise with dietary control, they were managed by insulin or oral hypoglycemic agents. In the present study it was observed that, 28.33% patients were delivered normally, 8.33% patients required instrumental vaginal delivery (Table 7). 48.33% patients delivered by emergency caesarean section; 15% patients underwent elective caesarean section. In the present study it was observed that most common indications for caesarean section inpatients with gestational diabetes mellitus were previous 1 or more CS which includes 28 cases, 10 cases were having cephalopelvic disproportion, 10 cases were having induction failure and 9 cases were of fetal distress, 10 cases had uncontrolled GDM (Table 8). In the present study, most common association of gestational diabetes mellitus in pregnancy is PIH that is 20 cases developed preeclampsia and 10 cases had uteroplacental insufficiency, and 44 cases had abnormality in amniotic fluid (polyhydramnios), 6 patients developed septicaemia, 2 patient had wound gap after caesarean section, 7 patients had intra uterine fetal death, 2 patient developed diabetic ketoacidosis, 12 cases underwent pre-term labor, 6 of them developed hypoglycaemia (Table 9). It is evident from table that in patients with diabetic pregnancy, incidence of preeclampsia was 16.67%, polyhydramnios was present in 36.67% of the patients, pre-term labor was present in 10% patients. In our study perinatal mortality was observed in 12 cases of gestational diabetes mellitus. Respiratory distress was present in 12 babies who required supplemental oxygen or positive pressure ventilation 26 neonates were required NICU management. In the present study, 17.5% babies had birth weight <2.5 kg, 66.67% babies had weight between 2.5-3.5 kg, 15.83% babies had weight between 3.6->4.0 kg.

Table 1: Age distribution of the patients in gestational diabetes mellitus (N=120).

Age (years)	N	%
<20	7	5.8
20-29	39	32.5
30-39	65	54.2
>40	9	7.5

Table 2: Distribution according to gestational age at which GDM is diagnosed (N=120).

Trimester	N	%
First	24	20
Second	38	31.77
Third	58	48.33

Table 3: Distribution according to gravida status of the patients (N=120).

Gravida	N	%
Primi	12	10
Second	19	15.83
Third	31	25.83
Four and above	58	48.33

Table 4: Distribution of cases according to the past history of gestational diabetes mellitus in multigravida patients (N=108).

Past H/O GDM	Multigravida	%
Present	43	39.81
Absent	65	60.19

Table 5: Distribution according to gravida status of the patients (N=120).

BMI (kg/m^2)	N	%
<20 (underweight)	19	15.83
20-24.9 (normal)	27	22.5
25-29.9 (overweight)	33	27.5
>30 (obese)	41	34.17

Table 6: Mode of management of the patients with the gestational diabetes mellitus (N=120).

Management	N	%
Life style modification and exercise with dietary control	21	17.5
Oral anti-diabetic agents + life style modification and exercise with dietary control	17	14.16
Insulin	82	68.34

Table 7: Mode of delivery in cases of gestational diabetes mellitus (N=120).

Mode of delivery		N	%
Vaginal delivery	Normal	34	28.33
	Instrumental	10	8.33
Caesarean delivery	Emergency	58	48.33
	Elective	18	15

Table 8: Indications of caesarean section in gestational diabetes mellitus.

Indications	N
Previous CS (1/2/3)	28
CPD	10
Fetal distress	9
Uteroplacental insufficiency	7
Uncontrolled GDM	10
Induction failure	10
PROM + oligo	2

Table 9: Maternal complications in gestational diabetes mellitus.

Maternal complications	N
Pre-eclampsia	20
Uteroplacental insufficiency	10
Polyhydramnios	44
Preterm	12
Post-partum haemorrhage	6
Septicemia	6
Diabetic ketoacidosis	2
Wound gap	2
Intrauterine fetal death	7
Maternal hypoglycemia	6

Table 10: Neonatal complications of gestational diabetes mellitus.

Neonatal complications	N
Pre-maturity	22
Macrosomia	7
Respiratory distress syndrome	12
Hyperglycemia	17
Hyperbilirubinemia	19
Congenital anomaly	8
NICU admission >24 hour	26
Perinatal mortality	12

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.

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 54.2% in age group of 30- 39 years.[3]

In the present study, 10% patients were primigravida, 15.83% patients were second gravida, 25.83% patients were third gravida, 48.33% patients were forth gravida. Study was compared to study of Thomas et al and it was observed that pregnancy with diabetes was more in multigravida patients. Prevalence of pregnancy with diabetes was 47.7% in primi patients and 50.3% in multipara in a study by Thomas et al.[4] The association between parity and diabetes is strongly linked due to obesity and age. 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 63.33%. Most common complications observed were preeclampsia, uteroplacental insufficiency, polyhydramnios, postpartum hemorrhage, septicemia sudden intrauterine fetal death. In the present study incidence of polyhydramnios was 36.67%, preeclampsia was 16.67%, preterm labor was present in 10% patients 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.[5]

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.[6] 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.[7-9] Study by Nigam et al showed incidence of hyperbilirubinemiain 14.2% newborns, macrosomia was found in 14.2% neonates.[7] 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.[10,11]

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. The findings of the present study confirmed that patients having pregnancy with GDM are liable to have adverse pregnancy outcomes. The study concluded that increased maternal age, high body mass index, multi gravidity, past history of diabetes and also family history were identified to be major risk factors. Patients with such factors should be identified as early as possible and classified as a high-risk group and called for frequent antenatal check- up as required. 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.

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