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Pregnancy with diabetes: The study of fetomaternal outcome in a tertiary care teaching centre in western India

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ABSTRACT

Objectives: To study the fetomaternal outcome in cases of pregnancy with diabetes and the measures to combat the consequences.**Materials and Methods:** A prospective observational study was conducted in a tertiary care centre with 70 patients taken under study, being carried out in a period of July-2020 to June- 2021 at Civil Hospital, Ahmedabad.**Results:** Increasing gravidity, age and past history of GDM was found to be one of the risk factor for such cases. 44% patients had polyhydramnios, 8% had uteroplacental insufficiency and there were 6%intrauterine deaths. 52 patients were managed by Insulin, 10 patients by oral antidiabetic agents and remaining 8 patients were managed alone with dietary therapy. 48% patients underwent emergency caesarean section, 28% delivered normally and 8% patients required instrumental vaginal delivery. 10 cases of pregnancy with diabetes developed hypertension, also there were 6% cases of macrosomia. Birth weight > 3.5 kg was 32% in incidence. Most of the neonates were taken to NICU for 24 hours of observation. Perinatal mortality was observed in 6 cases of pregnancy with diabetes mellitus.This is an Open Access (OA) journal, and articles are distributed under the terms of the [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License](https://creativecommons.org/licenses/by-nc-sa/4.0/), which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.For reprints contact: reprint@ipinnovative.com

1. Introduction

Diabetes mellitus is a chronic metabolic disorder due to either insulin deficiency or due to peripheral tissue resistance to the action of insulin. Also, it is most common complication of pregnancy. While in early 1990s, horrific mortality and morbidity were the destined consequences for the mother and her fetus, when pregnancy were complicated by overt diabetes, we have tamed it to some extent with the invention of insulin, still it remains a formidable complication of pregnancy. India is a no exception, with projected rates of 79.4 million in 2030- a 151% increase from 31.7 million in 2000.

Etiological classification goes as:¹

1. Type 1 (IDDM- Insulin Dependent Diabetes Mellitus)
2. Type-2 (NIDDM- Non Insulin Dependent Diabetes Mellitus)
3. Gestational Diabetes Mellitus
4. Others

Intrauterine environment in an area of keen interest as it is believed to have effects on later life. Women can be separated into those who were known to have diabetes before pregnancy- pregestational or overt, and those diagnosed during pregnancy - gestational diabetes. The current focus is whether diabetes antedates pregnancy or it is first diagnosed during pregnancy.

According to ADA,² pregnancy with diabetes complicates around 7% of pregnancies, whereas it's total incidence is estimated up to 17.8%, depending upon

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the ethnic and clinical characteristics of the population and diagnosed tests applied. Prevalence is also dependent on risk factors associated.³

Pregestational or overt diabetes may impose deleterious effects on embryonic development, hence there is 2-5 times risk of congenital malformation in fetus. The proportion of women who have had GDM possess seven fold higher risk of developing type-2 DM in the future. As well as the other risk of conditions like dyslipidemia, hypertension, and obesity along with cardiovascular complications may also occur. Recurrence of GDM in next pregnancies can also be encountered commonly. Hyperglycemic intrauterine environment may result in variety of consequences like sudden intrauterine death, respiratory distress syndrome, hypoglycemia, cardiomyopathy, neonatal jaundice, impaired calcium and magnesium homeostasis and even type-2 DM in later life.

We now clearly can state, early diagnosis and intervention can improve fetomaternal outcome. So detection of pregnancy with diabetes provides an opportunity to identify women at risk of short term and long term complications. Screening for pregnancy with diabetes is recommended because of its asymptomatic nature, but GDM may be missed before 24 weeks due to its pathophysiology of rising insulin resistance from second trimester. Preferred timing being around 24-28 weeks, But to the little surprise as per Cochran data, there is insufficient evidence to determine if screening for gestational diabetes or what type of screening, can improve maternal and infant health outcomes.⁴

2. Materials and Methods

The study was conducted in department of obstetrics and gynaecology, Civil Hospital, B.J. Medical college, Ahmedabad- a tertiary care teaching centre.

2.1. Inclusion criteria

1. All cases of pregnancies complicated by diabetes.
2. Patients who could be followed up, investigated and those in which fetal outcome could be recorded were only included.

2.2. Data collection

A proforma was filled in every case including detailed history, along with previous obstetric history, age, gravida status, gestational age, menstrual history, past, family and personal history were all recorded. General physical examination was done in every case as well as full obstetrical examination. Routine investigations and special investigations as and when required were done.

Ultrasound was done in every case and details of viability, gestational age, presentation, placenta, amniotic fluid index, effective fetal weight and any gross congenital

anomaly were recorded in detail. Doppler and fetal 2-D echo was carried out when indicated.

Management protocol were decided considering chief complaints of patient, maternal and fetal condition. Patients were followed by a blood sugar profile to measure the fasting blood sugar and 2 hours postprandial serum glucose levels. Induction if done, mode of delivery, fetal outcomes were all recorded.

All neonates were assessed by pediatrician, examined carefully and any congenital anomaly if present were noted. Mother and baby born both were followed up till discharge and further follow up was advised.

2.3. Study design

It was a prospective observational study of 70 cases of pregnancy with Diabetes Mellitus 5,967 delivered cases, carried out between the period of July-2020 to June-2021 at Civil Hospital, Ahmedabad.

3. Data analysis

Data was entered into a computer database using Microsoft Excel and analysis was done using a software Epi Info 7. Results are presented as frequencies, percentages and descriptive statistics.

4. Observation and Results

In the present study, 70 patients of cases of pregnancy with Diabetes Mellitus were studied for fetomaternal outcome in department of Obstetrics and Gynaecology, Civil Hospital, Ahmedabad.

The prevalence of pregnancy with diabetes in the present study was found to be 1.17%.

Table 1: Demographic data

		No. of patients	Percentage (%)
Age(years)	<20	06	9
	20-24	10	14
	25-29	12	17
	30-39	35	50
	>=40	07	10
	Gravida	Primi	07
Second		11	16
Third		18	26
Multi		34	48
Rural		17	24
Residence	Urban	53	76
	Booked	50	72
Booking status	Unbooked	20	28

The maximum number of patients, that is, 50% was in the age group of 30-39 years. 48% of them were fourth gravida. 76% were from urban areas. 72% patients were booked/registered.

Table 2: Distribution of cases according to the past history of gestational diabeted mellitus in multigravida patients

Past h/o GDM	No.=63 (Multigravida)	Percentage (%)
Present	24	38%
Absent	39	62%

It is evident from the above table that out of all 63 multigravida patients, 38% patients had past history of GDM.

Table 3: Distribution according to body mass index

BMI (kg/m ²)	No.(N=70)	Percentage (%)
<20 (underweight)	15	22%
20-24.9(normal)	14	20%
25-29.9(over weight)	18	26%
>30 (obese)	23	32%

Out of total 70 cases of pregnancy with Diabetes Mellitus, 56% patients had BMI more than normal, which is a risk factor for development of pregnancy with Diabetes.

Table 4: Antenatal ultrasonographic findings at admission

Parameter	No. of patients	Percentage%
Liquor		
Oligohydramnios	20	28%
Adequate	19	28%
Polyhydramnios	31	44%
Cardiac activity		
Present	66	94%
Absent	04	6%
Uteroplacental insufficiency		
Present	06	8%

In the present study, 44% patients had polyhydramnios, 8% had uteroplacental insufficiency, and there were 6% cases of intrauterine deaths.

Table 5: Mode of management of the patients with pregnancy with diabetes mellitus

Management	No. (n=70)	Percentage
Life style modification and exercise with Dietary control	08	11%
Oral Anti Diabetic agents + Life style modification and exercise with Dietary control	10	15%
Insulin	52	74%

Out of total 70 patients of pregnancy with Diabetes Mellitus, 08 patients were managed alone with dietary control with lifestyle modification and exercise and in another 10 patients oral anti-diabetic agents were added. 52 patients were managed by insulin.

28% patients delivered normally, 8% patients required instrumental vaginal delivery. 48% patients delivered by

Table 6: Mode of delivery in cases of pregnancy with diabetes mellitus

Mode of Delivery	No.	Percentage
Vaginal delivery	20	28%
Normal	06	8%
Instrumental	34	48%
Caesarean delivery	10	16%
Emergency		
Elective		

emergency caesarean section and 8% patients underwent elective caesarean section.

Table 7: Maternal complications in pregnancy with diabetes mellitus

Maternal Complications	No. of Patients
Preeclampsia	10
Uteroplacental insufficiency	06
Polyhydramnios	22
Preterm labor	07
Post-partum haemorrhage	03
Septicaemia	03
Diabetic ketoacidosis	01
Wound gap	01
Intrauterine Fetal Death	04
Maternal hypoglycaemia	03

Most commonly Hypertension is associated with Diabetic pregnancy, i.e. 10 cases developed pre-eclampsia, 6 cases had uteroplacental insufficiency, 31 cases had polyhydramnios, 3 patients developed septicemia, 1 patient developed wound gap after caesarean section, 1 patient developed diabetic ketoacidosis, 7 cases underwent pre-term labour and 3 of them developed hypoglycemia.

Table 8: Distribution according to birth weight of baby

Birth Weight (kg)	No(n=70)	Percentage
< 2	10	14%
2-2.5	15	22%
2.5-3	14	20%
3.1-3.5	21	30%
3.6-3.9	6	8%
4	4	6%

In the present study, 14% babies had birth weight <2kg, 22% babies had birth weight between 2-2.5kg. 20% babies had birth weight between 2.5-3kg, 30% babies had birth weight between 3.1-3.5kg, 8% babies had birth weight between 3.6-3.9kg and 6% babies had birth weight of 4 kg.

According to the results, 7 babies developed hypoglycemia, 13 required neonatal intensive care unit for > 24 hours. Respiratory distress was seen in 6 babies.

5. Discussion

Table 1 shows that increasing maternal age is one of the risk factors and also the frequency was more in multipara

Table 9: Neonatal complications of the present study

Neonatal Complication	No. of patients
Prematurity	17
Macrosomia	04
Respiratory Distress Syndrome	06
Hypoglycaemia	07
Hyperbilirubinemia	11
Congenital anomaly	04
NICU admission >24 hours	13
Perinatal mortality	06

patients. Because of the possible etiological factors like sedentary lifestyle, insufficient sleep duration, stressful life, larger proportion of people were seen in urban areas. 28% patients were unbooked, i.e. those cases who were referred from primary centres. Booked cases get antenatal care so in those cases if any complications occur, it can be diagnosed early and interventions are possible before advanced stage of fetomaternal damage.

Table 2 states that 38% patients had past history of GDM, hence it is a risk factor for recurrence of GDM in next pregnancy. According to Table 3, 56% patients had BMI more than normal, which is a risk factor for development of pregnancy with diabetes. Results were comparable to study of Binny Thomas et al⁵ pregnancy as 53.6% patients were having BMI >25%. Thus, high BMI is a risk factor for pregnancy with diabetes mellitus, diet and exercise are important component of the treatment. A close watch on the weight gained during pregnancy at each antenatal visit is important as both obesity and diabetes are associated with macrosomia. Similarly, excess weight gain and edema may be an early sign of developing preeclampsia.⁶

As per Table 4, in the present study, 44% patients had polyhydramnios which was comparable to the study by Jindal et al⁷ in which 28% cases developed polyhydramnios as it is more common in patients with diabetes in pregnancy due to fetal hyperglycemia resulting in increased osmotic diuresis which subsequently leads to polyuria and development of polyhydramnios. 8% patients had uteroplacental insufficiency. There were intrauterine deaths in 6% cases.

We can see from Table 5, that out of total 70 patients of pregnancy with diabetes mellitus, 08 patients were managed alone with the dietary control by lifestyle modification and exercise and in another 10 patients oral antidiabetic agents were added. 52 patients of pregnancy with diabetes mellitus were managed by insulin, 26% patients were treated by medical nutrition therapy and exercise only, compared to 16% in a study by Binny Thomas et al⁵ study. Around 30 minutes of mild to moderate exercise daily helps in improving glycemic control by improving insulin sensitivity at the skeletal muscle level. This reduces overall insulin requirement.

Table 6 shows that 48% patients underwent emergency caesarean section, 28% delivered normally and 8% patients required instrumental vaginal delivery. In the study conducted by Jindal et al⁷ caesarean section was required in 44% of diabetic pregnant patients. This indicated that strict glycemic control might reduce the rate of preterm delivery. Vaginal delivery can be allowed after a proper assessment of pelvic adequacy, labor induction can also be done. Care must be taken during second stage. Baby must be evaluated by the neonatologist. Pregnancy with diabetes is not an indication for delivery before 38 weeks of gestation in the absence of evidence of fetal compromise.

As it is seen from Table 7 most common association of pregnancy with diabetes is hypertension that is 10 cases developed preeclampsia, 6 cases had uteroplacental insufficiency, 31 cases had polyhydramnios, 3 patients developed septicemia, 1 patient had wound gap after caesarean section, 4 patients had intra uterine fetal death, 1 patient developed diabetic ketoacidosis, 7 cases underwent preterm labor and 3 of them developed hypoglycemia. Thus, pregnancy with diabetes mellitus is associated with significant complications during pregnancy. Patients also have higher risk of future GDM and type-2 diabetes. Incidence of PIH in pregnancy with diabetes was 15% in study by Siddgi et al.⁸ Various explanations for sudden fetal demise have been proposed which include maternal hypoglycemia, ketoacidosis, chronic hypoxia, placental villus edema impairing nutrient transfer. In the present study, 76% were full term deliveries, 24% neonates were preterm which was comparable to a study by Yang et al,⁹ in which incidence of preterm birth was 28%. The main causes for indicated preterm deliveries were preeclampsia, fetal growth restriction, poor glycemic control, congenital malformation, non-reassuring fetal heart rate.

When present study was compared to study of Binny Thomas et al⁵ as per Table 8, it was found that cases of macrosomia in the present study were 6% as compared to 8.2% of study by Binny Thomas et al. In the study by Jindal et al.⁷ incidence of birth weight > 3.5 kg was 32%. Peterson hypothesis is held responsible for causing macrosomia. This effect is seen after 20 weeks of gestation, when fetal pancreatic islet cells are capable of secreting insulin in response to hyperglycemia.¹

Table 9 states that most of all the neonates, after birth were taken immediately to neonatal intensive care unit (NICU) for observation for 24 hours. 7 babies developed hypoglycemia and were treated with intravenous glucose. 13 babies required NICU for >24 hours respiratory distress was present in 6 babies. In our study perinatal mortality was observed in 6 cases of pregnancy with diabetes mellitus.

6. Conclusion

Diabetes Mellitus is one of the most common medical disorders encountered along with pregnancy. Clinical

recognition of it is important because timely intervention by dietary measures and/or insulin can reduce the well-known maternal and fetal complications associated with it.

Present study showed that increased maternal age, high body mass index, multigravidity, past history of diabetes and also family history were identified to be major risk factor. Screening is before 24 weeks is strictly recommended in these cases. High rate of maternal complications like gestational hypertension, polyhydramnios, preterm labor, intrauterine fetal death, PPH, wound gap, septicemia were found in our study rate of caesarean section was higher. Importance of contraception should be reminded and the pre-conception care while planning future pregnancy. Neonates born to diabetic mother had increased rate of macrosomia and metabolic complications, leading to increase in perinatal morbidity and mortality rates.

In a nutshell, we derive that educating patients about regular antenatal care and proper screening is important tool to reduce maternal and perinatal morbidity and mortality. Universal screening and team approach comprising of an obstetrician, diabetologist, anaesthetist, physician and neonatologist is the cornerstone in the management of pregnancy with diabetes mellitus. The importance of driving the concern to this condition is because 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.

7. Source of Funding

None.

8. Conflict of Interest

None.

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