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Original Research Article

Optimal management of diabetic pregnancies and its current practice: a one-year study in a tertiary care center

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ABSTRACT

Background: Diabetes is one of the largest global health emergencies of 21st century and Gestational diabetes mellitus (GDM) is one of the most crucial illnesses complicating women of child-bearing age. The objectives of this study is to determine the maternal and fetal outcome of pregnancies complicated by maternal diabetes either GDM or pre-existing diabetes.

Methods: An analysis of pregnant women was done retrospectively at KLES Dr. Prabhakar Kore Hospital and Medical Research Centre, Belgaum. 171 cases were diagnosed with diabetes mellitus in pregnancy. 162 cases developed GDM and 9 had pre-existing diabetes. Pregnant women who were found to be diabetic pre conceptionally or in the first trimester were classified as pre-existing diabetes. All pregnant women diagnosed with diabetes mellitus were studied and relevant maternal and fetal outcomes and complications were assessed.

Results: There were 171 diabetic women in this retrospective study out of which 94.7% had GDM and 5.26% had pre-existing diabetes. Rate of pre-eclampsia was 24.56%, preterm delivery was 17.54% and polyhydramnios was 15.20%. Rate of caesarean section were 57.30% and vaginal delivery was 45.06%. In fetal and neonatal complications, the rate of fetal macrosomia was 11.1%, hyperbilirubinemia 15.78%, respiratory distress syndrome 9.94%.

Conclusions: Diabetes in pregnancy is associated with increased risks to the maternal and fetal complications. The aim of this study is to lay emphasis upon early detection, screening and timely management that will reduce the adverse outcomes in both mother and fetus. predicted.

Keywords: Gestational diabetes mellitus, Pre-existing diabetes, Maternal outcome, Fetal outcome, Complications

INTRODUCTION

Gestational diabetes mellitus (GDM) is defined as carbohydrate intolerance resulting in hyperglycaemia of variable severity with onset or first recognition during pregnancy.¹ Diabetes is the most common disease entity complicating pregnancy. Many women of childbearing age are having either pre-existing (type I or type II) diabetes or they develop GDM during pregnancy.²

Indian women have eleven-fold increased risk of carbohydrate intolerance during pregnancy compared to European women.³ The recent data shows the prevalence of GDM in India to be 18%.⁴

In the present study population, the diabetes in pregnancy study group India (DIPSI) guidelines have been followed for screening of subjects at 24-28 weeks of gestation in pregnant women not previously known to have diabetes. Also, DIPSI guideline is feasible and economical mode of evaluation.

Diabetes in pregnancy is associated with increased risk of maternal and fetal complications. Maternal complications occurring during GDM are pregnancy induced hypertension, maternal infection etc. Pregnancy complications include preterm labour, polyhydromnios and intrauterine fetal death. Fetal complications are fetal macrosomia, hypoglycemia, hyperbilirubinemia, Respiratory distress syndrome (RDS) etc.

Perinatal outcomes associated with poor glycaemic control in mothers are associated with mortality as high as 42.9%.⁵ Appropriate diagnosis and management of diabetes in mother can improve maternal and perinatal outcome.

This study was conducted to obtain information about relevant maternal and fetal outcomes of diabetic mothers in pregnancy and to lay emphasis upon early detection, screening and timely management that will reduce the adverse outcomes in both mother and fetus.

METHODS

This is a one year retrospective audit of the maternal and fetal outcomes of women who presented to the KLES Dr. Prabhakar Kore Hospital and Medical Research Centre, Department of Obstetrics and Gynaecology, Belagavi, from September 2016 to August 2017, with GDM or pre-existing diabetes with pregnancy.

Pregnant women who were found to be diabetic preconceptionally or in the first trimester were classified as ‘pre-existing diabetes’. This study demonstrated DIPSI guidelines for India adopting a single step non-fasting Oral glucose tolerance test (OGTT) using a 2 hours venous plasma glucose cut point of 140 mg/dl (7.8 mmol/l) at 24-28 weeks as a screening and diagnostic test for GDM.

Every pregnant women with GDM and pre-existing diabetes were managed by a multidisciplinary team involving an obstetrician, physician, pediatrician, ophthalmologist and dietician. Proforma was used to collect data from the medical records post delivery which included: Age of the mother, parity, gestational age at the time of delivery, birth weight of the baby and fetal outcome. Congenital malformations were also noted. Maternal and fetal assessment was done using clinical examination, investigations and ultrasonography. Pregnant women with diabetes having any other medical complications like essential hypertension, renal disease, heart disease or epilepsy were excluded.

Macrosomia was defined as birth weight >4 kg for both GDM and pre-existing diabetic group. The collected data was tabulated and was entered on Microsoft excel software. Statistical analyses was performed using the Statistical package for social sciences (SPSS) 20.0 (SPSS Inc, Chicago, Illinois). Chi-square test was performed to assess the statistical significance. All p values were 2 tailed and values of ≤0.005 were considered significant.

Sample size

With an estimated incidence of neonatal complications in mothers with diabetes mellitus between 7-9% based on previous reports, keeping same proportion for this study and considering 95% confidence interval (95% CI) width the sample size was estimated to be 171.

RESULTS

There were 171 (2.69%) diabetic women in this retrospective study, out of which 162 (94.73%) were GDM while 9 (5.26%) were having pre-existing diabetes (all were type 2 diabetes).

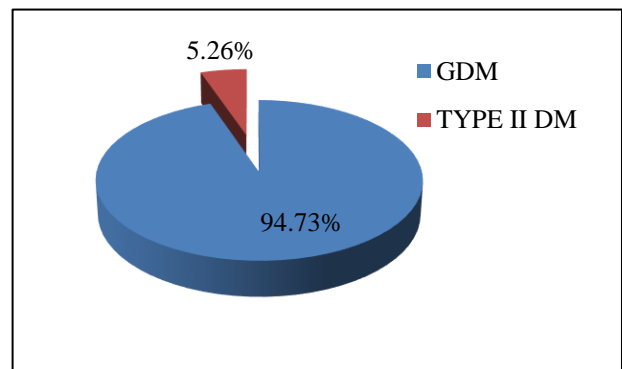


Figure 1: Type of diabetes in pregnant women.

There were 94 multigravid women (54.97%) and 77 primigravid women (45.02%). Our main aim was to analyze data in such a way that we can plot certain inferences regarding diabetic pregnant women.

As shown in table 1 mean maternal age at time of diagnosis was 23.22 years in GDM and 29.41 years in pre-existing diabetes group. The mean age of the patients using unpaired t-test was 25.33±3.17 years.

Table 1: Pregnancy-related history of diabetic women in study.

Patient's history	GDM (n=162)	Pre-existing diabetes (n=9)	P value
	N (%)	N (%)	
Maternal mean age distribution	23.22	29.4	
Mode of delivery			<0.001
LSCS	91 (56.17)	7 (77.7)	
Vaginal delivery	71 (43.82)	2 (22.2)	
Parity			<0.001
Primigravida	84 (51.85)	3 (33.3)	
Multigravida	78 (48.14)	6 (66.6)	

The total number of women who underwent caesarean delivery was 98 (57.30%) and vaginal delivery was 73 (42.69%), and mode of delivery had a statistically significant association with the presence of diabetes in pregnancy ($p < 0.001$).

Distribution of diabetic women according to their obstetric history is included and shown in table 1. Among the GDM group, there were more primigravida as compared to multigravida 51.85% vs 48.14% respectively. In the pre-existing diabetes group there was reverse trend as 66.6% were multigravida and only 33.3% were primigravida. The association was found to be statistically significant. ($p < 0.001$).

Table 2: Indications for caesarean section.

Indication	GDM (n=91)	Pre-existing diabetes (n=7)
CPD	4	0
Previous LSCS	23	1
Fetal distress	17	0
Uncontrolled GDM	3	1
Breech presentation	2	0
Twin gestation	5	0
Failure to progress	3	0
Fetal macrosomia	17	2
PIH	16	3
BOH	1	0

Out of 162 mothers with GDM, 91 underwent CS and 7 mothers with pre-existing diabetes underwent CS. Table 2 shows indications of caesarean sections (CS). In our study most common indications of CS was due to previous Lower segment caesarean section (LSCS) (25.27%) in GDM and Pregnancy induced hypertension (PIH) (42.85%) in pre-existing diabetes group.

Table 3: Comparison of prevalence of risk factors in GDM and Pre-existing diabetes population.

Complications	GDM (n=162)	Pre-existing diabetes (n=9)	P value
	N (%)	N (%)	
Pre-eclampsia	39 (24.07)	3 (33.3)	<0.002
Polyhydramnios	24 (14.81)	2 (22.2)	
Preterm labour	28 (17.28)	2 (22.2)	
PROM	9 (5.55)	2 (22.2)	
Uneventful	61 (37.65)	2 (22.2)	

Among the various maternal complications that were studied, the leading complication was pre-eclampsia 24% in the GDM group as compared to 33% in the pre-existing diabetes group, preterm labour (17.28% in GDM group

versus 22.2% in pre-existing diabetes group) and polyhydramnios (14.8% in GDM group versus 22.2% in the pre-existing diabetes group). There were more complications in the group with pre-existing diabetes as shown in Table 3 and the difference was found to be statistically significant ($p < 0.002$).

For mothers having diabetes mellitus, birth weight of the babies ranged from 1.4-4.5 kgs as shown in Table 4. There was more number of neonates with birth weight between 2.8-3.4 kgs in GDM group than in pre-existing diabetes group, and the difference was found to be statistically significant ($p < 0.00001$).

Table 4 also shows the neonatal outcomes in both the groups. The prevalence of hyperbilirubinemia (15.78%), hypoglycaemia (6.43%), RDS (9.94%) and Neonatal intensive care unit (NICU) admissions was high in both GDM and pre-existing diabetes mothers and association was found to be statistically significant ($p < 0.001$).

Table 4: Neonatal outcomes in diabetic mother.

Variables	GDM (n=162)	Pre-existing diabetes (9)	P value
	N (%)	N (%)	
Birth weight			
< 2	19 (11.7)	3 (33.3)	<0.00001
2-2.9	95 (58.64)	2 (22.22)	
3-3.9	46 (28.39)	3 (33.3)	
≥4	2 (1.23)	1 (11.1)	
Complications			
Hypoglycaemia	10 (6.27)	1 (11.1)	<0.001
Hyperbilirubinemia	24 (14.81)	3 (33.3)	
RDS	15 (9.25)	2 (22.2)	
Uneventful	113 (70)	1 (11.1)	

There were two intrauterine deaths (1.16%) and both women had uncontrolled gestational diabetes. Three neonates (one male and two female) had congenital malformations and their mothers had poor glycaemic control. Two were diagnosed antenatally (bilateral (B/L) renal agenesis and sacral meningocele with spina bifida) and one male neonate had diaphragmatic hernia diagnosed after birth.

DISCUSSION

Pregnancy is a diabetogenic state. The present retrospective hospital based study, showed the prevalence of diabetes mellitus in pregnant women as 2.9%. GDM prevalence has been reported variably from 1.4-14% worldwide and varies among different racial and ethnic groups.⁶ Compared to European women, the prevalence of gestational diabetes has increased 11-fold in women from the Indian subcontinent.³

Compared with GDM subjects, type 2 diabetes mellitus patients were older, with the mean ages of the two groups being 23.22 ± 3.11 years and 29.4 ± 2.44 years respectively. Similar study from South India showed age >25 years as a risk factor for GDM.⁷

Caesarean delivery rate in our study was 57.3% amongst the diabetic mother, with the most common indication being previous LSCS followed by fetal distress and PIH. Huddle reported caesarean section rate of more than 60% and Kapoor et al reported 67% which were similar to the numbers observed in our study.^{8,9} There is uncertainty in guidelines regarding the preferred method and timing of delivery in women with gestational diabetes. Barring any maternal or fetal complications, obstetricians routinely deliver at 40 weeks of gestation.¹⁰ However our departmental policy to admit uncomplicated diabetic mothers at 36 weeks and if they are having poor glycaemic control they are admitted even before 36 weeks which is one of the reasons for caesarean section rate being high in our study. Delivery was planned at 38 weeks in type 2 diabetes mellitus and at 40 weeks in GDM group.

Insulin is the first line pharmacologic therapy for GDM.¹⁰ However, there is some evidence that oral hypoglycaemic agents (OHAs) such as metformin are safe in pregnancy.¹¹ Decision making with respect to the initiation of insulin is often driven by patient preference. Similarly, in our institution anti diabetic medications and insulin was started when diet and exercise were unable to maintain glucose metabolism.

Our study revealed that the most common complications seen in diabetic mothers were gestational hypertension (24.56%) followed by preterm labour (17.54%), and polyhydramnios (15.20%). Gajjar found that most common maternal complication seen in GDM mothers was gestational hypertension (36.4%) followed by abruptio placenta (20%).¹² Another study of 972 GDM mothers in Saudi Arabia showed that the common complications were perineal tear (18%) that caused postpartum haemorrhage, followed by gestational hypertension (2%).¹³

This present study demonstrated that 10.4% of new-borns of GDM mothers had macrosomia's as compared to 22.2% in the pre-existing diabetes group. Hong et al also found an incidence of 10.49% of macrosomia in the GDM group and 11.1% in type 2 diabetes mellitus group.¹⁴

Our study showed that the prevalence of congenital malformation was 1.75% and perinatal mortality was 1.16%. There was one intra uterine death; one still birth and both the mothers had poor glycaemic control. Three neonates (one male and two female) had congenital malformation. Two diagnosed antenatally (B/L renal agenesis and sacral meningocele with spina bifida) and one male neonate had diaphragmatic hernia diagnosed after birth. Kapoor et al reported 10 times higher risk of congenital malformation and 4-7 times higher risk of perinatal mortality in GDM group.⁹

The incidence of neonatal hypoglycaemia and hyperbilirubinemia was 6.43% and 15.78% respectively, which was in concordance with the observations of a case control study done in Brazil.¹⁵ The incidence of hypoglycaemia and hyperbilirubinemia in that study were 16.3% and 6.1%, respectively.

In the present study, the neonates of diabetic women were managed as per protocol. They had regular sugar monitoring and other investigations to rule out further complications.

This study reconfirms that hyperglycaemia during pregnancy (either due to GDM or type 2 DM) is associated with maternal morbidity and fetal morbidity and mortality. Pregnant women should have regular antenatal visits for early and prompt detection of diabetes in pregnancy and advised regarding lifestyle modification including diet control and exercise. Mother should be counselled that baby has a potential to develop metabolic syndrome in his or her life. Diabetic women should be managed by multidisciplinary team and regular antenatal fetal surveillance should be done. The best course of action for the management of diabetes is screening, early detection, and intervention whenever necessary.^{16,17}

Limitations of the study

The main limitations of our study are the retrospective design; the duration between diagnosis and intervention was not available; the rate of gestational weight gain in each trimester was not available and the glycaemic control data were not captured.

CONCLUSION

Diabetes in pregnancy is associated with increased risks to the mother and the fetus. Screening, early detection and timely management will reduce the adverse outcome of mother and fetus. Pre-eclampsia, preterm delivery and polyhydromnios were the most common maternal complications. Hypoglycaemia, hyperbilirubinemia and RDS were the common neonatal complications requiring NICU care.

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