Diabetes Mellitus in Pregnancy and Peritanal Outcome A Six-Year Experience in a Training Hospital

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Abstract

The aim of this study is to analyse 103 diabetic pregnancies managed at a single unit between January 1996 and December 2002. We retrospectively analysed 103 pregestational and gestational diabetic patients and compared perinatal outcomes of diabetic pregnancies with that of a same number of nondiabetic pregnancies managed at the same unit (control group). We studied 12 patients with pregestational diabetes and 77 patients with gestational diabetes. In pregestational diabetic group there were 8 patients with type 1 diabetes and 4 patients with type 2 diabetes. Preeclampsia developed in 9 cases with a rate of 10.1%. Incidences of preterm delivery and postterm delivery were 9% and 3.3% respectively. Cesarean sections (CS) were performed in 47.1% of patients. 7.14% of neonates were small for gestational age, 83.85% were appropriate for gestational age and 9.1% were large for gestational age. Sixteen (9%) newborns had respiratory problems but none of them needed neonatal intensive care. Seven cases had congenital anomalies, one had micrognathia, one had ventricular septal defect and dextroposition of the aorta, and five had ventricular septal defects. Good glycemic control is the cornerstone of treatment of pregnant with diabetes. Our results are similar to previous reports.

Key words: ????????
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Introduction

Diabetes mellitus is the most common medical complication of pregnancy. 2 to 5% of all pregnancies are complicated with diabetes (1-3). Ninety percent of pregnant diabetics have gestational diabetes, remaining 10% consist of insulin dependent diabetes mellitus (IDDM, Type 1) and noninsulin dependent diabetes mellitus (NIDDM, Type 2) (4).

Gestational diabetes mellitus is defined as carbonhydrate intolerance of variable severity diagnosed for the first time during pregnancy. While there is not a universal consensus on the timing and method of diagnosis, there is consensus that every pregnant patient should be screened for gestational diabetes. Thus, once diagnosed, with appropriate glycemic control, diabetic pregnancies have perinatal morbidity and mortality rates very close to those of nondiabetic pregnancies.

Maternal and fetal – neonatal morbidity and mortality are closely related with plasma glucose levels during preconceptional and gestational periods. While vascular complications and particularly pregnancy induced hypertension are important for the mother, macrosomia and congenital anomalies are important complications for the fetus. In order to prevent these complications and improve perinatal mortality rate, appropriate timing and mode of delivery are as important as diagnosis and glycemic control during pregnancy (5-7).

The goal of this study is to review a 6-year experience in the management of 89 consecutive diabetic pregnancies and perinatal outcomes in our obstetrics department.

Materials and Methods

Between January 1, 1996 and December 31, 2002, 103 diabetic pregnancies were managed at our department. Records of 89 patients were retrospectively evaluated. Records of the remaining 14 patients were inadequate for inclusion to the statistical analysis.

We retrospectively analysed pregestational and gestational diabetic patients to examine maternal and fetal outcomes. Fetal outcomes included stillbirths, neonatal/perinatal mortality, size for gestational age and malformations. We compared perinatal outcomes of diabetic pregnancies with that of a same number of nondiabetic pregnancies managed at the same unit (control group). Control group was randomly selected from our archives.

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Diagnosis: At the first visit a detailed history, including a demographic profile and summary of past obstetric and medical information, was obtained from every patient. Maternal characteristics included age, parity, abortus, maternal weight, family history of diabetes mellitus, previous gestational diabetes mellitus, macrosomia (>4000 g), stillbirth and fetal anomalies. Fasting plasma glucose levels are measured at the second visit.

Gestational diabetes screening was performed with a 50 g one hour oral glucose tolerance test between the 24th and 28th weeks of pregnancy. Cut off value for 50 g loading was 130 mg/dL. When cut off value was exceeded a 100 g 3 hours oral glucose tolerance test was performed. Plasma values suggested by the American National Diabetes Data Group were used for interpretation of test results. Gestational diabetes was diagnosed when any two values were met or exceeded.

Therapeutic protocols: All pregnant women received intensive metabolic therapy (normocaloric diabetic diet, self monitoring of blood glucose level and individually tailored insulin regimen when needed). Therapeutic protocols were tailored to the patients' glycemic, social and educational conditions. Insulin therapy was initiated when a patient could not follow her diet properly, or her fasting glucose levels exceeded 105 mg/dL or postprandial plasma glucose levels exceeded 120 mg/dL. Goals of the insulin therapy were plasma glucose levels of 60 to 100 mg/dL and 100 to 120 mg/dL for fasting and 2 hours after a meal respectively.

Antepartum care was provided by a team consisting of obstetrician, internist, nurse and dietician.

Statistical analysis: Statistical analysis was performed by using Statistical Package for Social Sciences software, version 11.5. Chi-square and t-test are used for comparision of incidences and averages of the groups respectively.

Results

Between January 1st, 1996 and December 31st, 2002 there have been 10504 deliveries in our unit. 103 diabetic pregnancies have been managed at the same period.

The demographic characteristics and incidence of various risk factors among 89 patients are presented in Table 1. We studied 12 patients with pregestational diabetes and 77 patients with gestational diabetes. In pregestational diabetic group there were 8 patients with type 1 diabetes and 4 patients with type 2 diabetes.

The prevalance of pregnancies complicated with diabetes was about 1% in our unit. Preeclampsia developed in 9 cases with a rate of 10.1%. Incidences of preterm delivery and postterm delivery were 9% and 3.3% respectively. Cesarean sections (CS) were performed in 47.1% of patients. 7.14% of neonates were small for gestational age, 83.85% were appropriate for gestational age and 9.1% were large for gestational age. Two cases had a history of gestational diabetes and 7 cases had macrosomic infants. 9 cases had a history of stillbirth, and 1 case had delivered a child with congenital anomalies before. These data are summarized and compared with the data of non diabetic pregnancy group in Table 2.

Table 1. Demographic characteristics and incidence of various risk factors among patients

	Diabetic pregnancies	Nondiabetic pregnancies	
	Mean ± SD	Mean ± SD	p value
Age (Years)	31.1 ± 5.7	27.4 ± 6.22	0.000*
Parity	1.7 ± 1.6	1.4 ± 1.2	0.290
Abortus	0.3 ± 0.6	0.2 ± 0.5	0.221
Maternal weight (kg)	78.1 ± 13	68.8 ± 8.8	0.000*
Family history of diabetes mellitus (no, %)	17 (19.1)	5 (5.61)	0.005*
Previous gestational 2 diabetes mellitus (no, %)	(2.2)	0 (0)	0.240
Previous macrosomia (no, %)	7 (8)	2 (2.2)	0.980
Previous stillbirth (no, %)	9 (10.2)	3 (3.37)	0.070
Previous fetal anomalies (no, %)	1 (1.1)	1 (1.1)	1

SD, standart deviation; * statistically significant difference.

Table 2. Parameters of glycemic control and obstetric data of the patients

	Diabetic Pregnancies	Nondiabetic pregnancies	P value
Admission to antenatal visit (wk)	29 ± 9	33 ± 8	0.002*
Estimated gestational age at delivery (wk)	38.7 ± 1.3	39.1 ± 3.5	0.401
Birth weight (g)	3536 ± 609	3341 ± 480	0.022*
Cesarean section (no, %)	41 (47.1)	16 (17.9)	0.000*
Stillbirth (no, %)	0 (0)	3 (3.3)	0.246
Preeclampsia and pregnancy induced hypertension (no, %)	9 (10.1)	3 (3.3)	0.073
LGA newborn (no, %)	24 (28.5)	7 (8.2)	0.001*
Preterm delivery (no, %)	8 (9)	8 (8.9)	1
Postterm delivery (no, %)	3 (3.3)	25 (28)	0.000*
Shoulder dystocia (no, %)	2 (2.2)	0 (0)	0.497

Wk, weeks; LGA, large for gestational age; * statistically significant difference

Sixteen (9%) newborns had respiratory problems but none of them needed neonatal intensive care. Ventricular septal hypertrophy was diagnosed in 6 (6.7%) cases, 5 (5.6%) of them were found to have ventricular septal defects. Seven cases had congenital anomalies, one had micrognathia, one had ventricular septal defect and dextroposition of the aorta, and five had ventricular septal defects. 28 (33%) newborns had hypoglycemia, 12 (14%) had hypocalcemia, 10 (12%) had polycytemia and 21 (25%) had hyperbilirubinemia.

Table 3. Comparision of metabolic problems among infants of pregestational and gestational diabetic mothers

Metabolic problems	Pregestational pregnancies	Gesational pregnancies	p value
Hypoglycemia (no, %)	8 (66)	20 (26)	0.008*
Hypocalcemia (no, %)	6 (50)	6 (7.8)	0.000*
Polycythemia (no, %)	2 (16.6)	8 (10.3)	0.619
Hyperbilirubinemia (no, %)	6 (50)	15 (19.4)	0.021*

Discussion

Diabetes mellitus during pregnancy is associated with increased perinatal mortality, increased rate of CS, significant risk of macrosomia and other neonatal morbidities including serious birth trauma, hypoglycemia, hypocalcemia, polycythemia and hyperbilirubinemia. Good glycemic control is the cornerstone of treatment of diabetic pregnancies (8).

The prevalance of diabetic pregnancies is 1% in our unit. We think, this lower than reported prevalance may result from underdiagnosis of gestational diabetes in our unit. Patients' late admissions for antenatal controls may account for proposed underdiagnosis of gestational diabetes.

Maternal age over 30, obesity, family history of diabetes, previous delivery of a large for gestational age infant or an infant with congenital anomalies, persistent glucosuria, unexplained fetal losses and hypertension are risk factors for gestational diabetes (9). In our series, maternal age, weight and famil history of diabetes differed significantly among diabetic and nondiabetic pregnancies, but differences between other risk factors as gestational diabetes in a previous pregnancy, previous macrosomia, previous fetal loss and previous delivery of an infant with congenital anomalies did not reach to statistical significance (Table 1). We believe this is due to the small size of our sample.

Gestational diabetes is more common than type 1 and type 2 diabetes in the pregnancy period. Perinatal morbidity and mortality is higher in pregestational diabetes (9, 10). In our series all of the metabolic problems except polycythemia were more common among pregestational diabetic mothers' children than gestational diabetic mothers' children, data are summarized in Table 3.

In our series average birth weight of the infants of diabetic mothers was in the normal range, but the difference between average birth weights of infants in diabetic and nondiabetic pregnancies was statistically significant (Table 2).

Fetal macrosomia is a common complication of diabetes during pregnancy. Several authors advised cesarean section as the route of delivery for patients with an estimated fetal weight over 4500 g to prevent shoulder dystocia and birth trauma (5,11). There were 6 cases with estimated fetal weight over 4500 g in our series. Three of them were delivered with cesarean section. There were no complications related to the route of delivery in the 3 cases delivered vaginally. Two cases with shoulder dystocia had delivered babies weighing less than 4500 g.

The 36th week of pregnancy has been offered by several authors as the optimum date for termination of diabetic pregnancy in order to prevent sudden and unexpected intrauterine death (6). Good glycemic control is now considered to be more important to improve the perinatal morbidity and mortality. So uncomplicated diabetic pregnancies are allowed to progress to the 38th or even 40th week of pregnancy. Uncomplicated diabetic pregnancies are followed until the 40th week in our unit. On completion of 40th week of pregnancy, labor was induced unless there was an obstetric indication for cesarean section. In our series there are 3 cases who have delivered after the 40th week of pregnancy. One of them was admitted to our unit at the 41st week of pregnancy for the first time. First antenatal visits of remaining two cases were at the 22nd and 36th weeks of pregnancy, but they did not come for follow-ups until their deliveries at the 42nd weeks of their pregnancies. One of them delivered a fetus weighing 4700 g with cesarean section.

31% of our cases admitted to our unit after the 35th week of pregnancy, only 19% of cases admitted before the 24th week. 11% of cases admitted at delivery. This delay in the first admission limits our opportunity for optimal glycemic control. On the other hand, comparison of first admission dates of diabetic and nondiabetic groups reveals that women with gestational diabetes have admitted significantly earlier than nondiabetic women (Table 3). We believe this difference may result from underdiagnosis of gestational diabetes in the late admitting group.

It is estimated that 25% of all diabetics develop preeclampsia during pregnancy (12). In our series 9 (10.1%) cases developed preeclampsia.

Cesarean section was the route of delivery for 47.1% of diabetic pregnancies in our unit (Table 3). This high percentage of cesarean delivery is similar to other reports

in literature. Leading indication for cesarean section was intrapartum fetal distress.

There were no fetal losses and seven congenital anomalies in our series.

Perinatal outcome in our series is similar to other worldwide reports. If we can provide earlier patient admittance, and regular antenatal examinations, perinatal morbidity and mortality in diabetic pregnancies as well as in nondiabetic pregnancies, may be even lower in our region.

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