

Maternal and Perinatal Outcome in Gestational Diabetes Mellitus Compared to Pregestational Diabetes Mellitus

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Abstract

Background: Diabetes mellitus is the most frequently encountered endocrine disorder in pregnancy and is associated with adverse outcomes if remain undiagnosed or untreated.

This study was done to compare the maternal and perinatal outcome of pregestational diabetes mellitus (PGDM) with that of gestational diabetes (GDM).

Methods: This observational analytical study with group comparison was carried out in the Department of Obstetrics and Gynaecology, BIRDEM General Hospital, Dhaka from July 2015 to June 2016. This study was conducted on two groups of pregnant women: group A (PGDM) and group B (GDM). A total of 100 cases were selected and in each group 50 pregnant women were enrolled. Singleton pregnancy and age 18 to 45 years were included. Pregnancy with hypertension, heart disease, renal disease and other metabolic disorders were excluded.

Results: In this study mean gestational age of the study subjects were 35.72 ± 2.61 weeks and 36.58 ± 2.34 weeks in PGDM and GDM groups. History of GDM [34.0% vs 16.0%], intrauterine death (IUD) [14.0% vs 2.0%] and abortion [22.0% vs 6.0%] were significantly higher among PGDM patients than GDM patients. Regarding present pregnancy complications, polyhydramnios [32.0% vs 14.0%], preterm delivery [38.0% vs 20.0%], vulvovaginitis [28.0% vs 12.0%] and premature rupture of membrane (PROM) [24.0% vs 8.0%] were significantly higher in PGDM than GDM patients. Wound infection was significantly high in PGDM groups [35.7% vs 11.1%] among the patients delivered by lower uterine Cesarean section (LUCS). Regarding perinatal complications, hypoglycemia [22.0% vs 8.0%], birth asphyxia [24.0% vs 8.0%], RDS [24.0% vs 8.0%] were significantly higher among PGDM comparing GDM patients.

Conclusion: The maternal and perinatal outcomes of pregestational diabetes mellitus were less favorable than those of gestational diabetes mellitus.

Key Words : Gestational diabetes mellitus, pregestational diabetes, maternal outcome, perinatal outcome.

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Introduction

Diabetes mellitus is a chronic condition characterized by increased glucose levels in the body. The long-term increased levels of glucose, called hyperglycemia, result in various health complications.^{1,2} When diabetes mellitus is diagnosed before pregnancy, it is designated as pre-gestational diabetes mellitus (PGDM).

Gestational diabetes mellitus (GDM) is defined as a glucose intolerance of variable severity with onset or first recognized during the present pregnancy. The entity usually presents late in the second or during the third trimester.³ It is one of the most common medical complications of pregnancy.⁴ GDM can adversely

impact perinatal outcome, increase the risk of obesity in offspring and the subsequent development of diabetes in mothers.^{5,6} Prevalence of GDM is 9.7% according to the WHO criteria and 12.9% according to the ADA criteria in Bangladesh.⁷ South Asians are more prone to have diabetes at an earlier age and thus more vulnerable to GDM.⁸

Pregnancy is a great stressful physiological condition in women during their reproductive period. Hyperglycemia at the time of conception and in early pregnancy specially during organogenesis results in six fold increase in risk of midline defects in the developing embryo.³ Even a mild increase in glucose levels during pregnancy can adversely affect both the mother and fetus. Increased incidences of pre-eclampsia, preterm delivery, miscarriage, fetal malformation and perinatal mortality and morbidity have been reported in diabetic pregnancies in comparison to the general population.⁹ Hyperglycaemia during pregnancy is associated with macrosomia, which may subsequently lead to shoulder dystocia and birth trauma in addition to an increase in the rate of Caesarean sections.¹⁰

Globally, researchers are concerned about an increase in the prevalence of gestational diabetes mellitus (GDM) and pregestational diabetes (PGDM).¹¹ Middle Eastern countries are reported to have a high prevalence of GDM and PGDM, ranging from 4.7% in Iran¹² to 24.9% in the United Arab Emirates¹³ in comparison to the United States, where the prevalence ranges from 3.47% to 7.15%.¹⁴ PGDM and GDM are associated with adverse fetal and maternal outcomes.¹⁵ Adverse fetal outcomes include congenital anomalies, trauma during birth, macrosomia and perinatal mortality.¹⁶ Adverse maternal outcomes include increased rates of caesarean section and increased lifetime risk of developing type 2 diabetes.¹⁷ Caesarean deliveries may be associated with a range of morbidities, with complications ranging from mild to serious.¹⁸ Pregnant diabetic women have an increased risk of developing obstetric complications such as preeclampsia and preterm delivery and perinatal complications such as miscarriages and fetal malformations. These complications are observed more frequently in women with PGDM compared to women with GDM; this may be due to the prolonged and severe fetal exposure to hyperglycaemia.¹⁹

Number of studies on this subject done in our country is limited. So the present study is planned to find out

the maternal and perinatal outcome of pregnancy among patients with pregestational diabetes and gestational diabetes mellitus.

Methods

This observational analytical study was carried out in the Department of Obstetrics and Gynaecology in BIRDEM hospital, Dhaka, from July 2015 to June 2016 over a period of one year. Study was carried out between two groups of pregnant women. Fifty cases of PGDM pregnant women (Group-A) and 50 cases of GDM pregnant women of all trimester were enrolled from the Inpatient Department, Department of Obstetrics and Gynaecology, BIRDEM Hospital, Dhaka in this study. Singleton pregnancy and age 18 to 45 years (mean age 26±) were included. Pregnancy with hypertension, heart disease, renal disease and other metabolic disorders were excluded.

PGDM patients were diagnosed case of diabetes and GDM patients were selected after doing OGTT (diagnosed by diagnostic criteria of NICE Clinical Guideline, February, 2015). Then follow up was done for several times, during antenatal, intrapartum, post partum and perinatal period. The perinatal and postpartum complications were recorded during the period of hospital stay.

The purpose of the study was discussed with the patients who fulfilled the enrollment criteria. Information about the patients was recorded in the prescribed data collection form, after taking informed consent. Data were collected by interview and from records. Statistical analysis was performed by using window based computer software devised with Statistical Packages for Social Sciences (SPSS-21) (SPSS Inc, Chicago, IL, USA). Quantitative data were expressed as mean and standard deviation and qualitative data were expressed as frequency and percentage. Association between categorical variables was analyzed by Chi-square test and continuous variable by independent sample t-test. For all statistical tests, p value <0.05 was considered statistically significant.

Results

Total patients were 100, 50 in each group. There was no significant difference between group A (PGDM) and group B (GDM) regarding age and gestational age (Table I). Table II shows distribution of study subjects

according to past obstetric history. Bad past obstetric history was significantly high in PGDM. History of GDM, intrauterine death (IUD) and abortion was significantly high in group A (PGDM) than group B (GDM). There was no significant difference between group A and group B in blood glucose at fasting and at 2-hr ABF (Table III). Table IV shows polyhydramnios,

preterm delivery, vulvovaginitis and premature rupture of membrane significantly higher in group A than group B. Mode of delivery was comparable between two groups (Table V). Table VI shows no significant difference in intra-partum maternal complication between two groups as was true for pregnancy outcome (Table VII).

Table I Age and gestational age of the study population at enrollment (N=100)

	Group		p value
	Group A (Mean \pm SD)	Group B (Mean \pm SD)	
Age (years)	26.62 \pm 4.57	26.04 \pm 4.62	0.529
Gestational age (weeks)	35.72 \pm 2.61	36.58 \pm 2.34	0.087

Table II Distribution of study population according to their past obstetric history (N=100)

Past obstetric history	Group		p value
	Group A (n, %)	Group B (n, %)	
History of GDM	17 (34.0)	8 (16.0)	0.038
Congenital anomaly	6 (12.0)	2 (4.0)	0.140
IUD	7 (14.0)	1 (2.0)	0.027
Over weight baby	2 (4.0)	0 (0.0)	0.495
Stillbirth	1 (2.0)	0 (0.0)	1.000
Abortion	11 (22.0)	3 (6.0)	0.021

*Multiple responses

Table III Distribution of study population according to their mean blood glucose level at enrolment in the study (N=100)

Blood glucose	Group		P value
	Group A (Mean \pm SD)	Group B (Mean \pm SD)	
Fasting	6.68 \pm 1.19	6.47 \pm 1.10	0.347
2-hr ABF	11.92 \pm 1.23	12.25 \pm 1.38	0.219

Table IV Distribution of study population according to the complications in current pregnancy (N=100)

Present pregnancy complications	Group		P value
	Group A (n, %)	Group B (n, %)	
Abortion	3 (6.0)	2 (4.0)	1.000
UTI	13 (26.0)	15 (30.0)	0.656
Polyhydramnios	16 (32.0)	7 (14.0)	0.032
Preterm delivery	19 (38.0)	10 (20.0)	0.047
PIH/Pre-eclampsia	7 (14.0)	10 (20.0)	0.424
Vulvovaginitis	14 (28.0)	6 (12.0)	0.046
PROM	12 (24.0)	4 (8.0)	0.029
Oligohydramnios	1 (2.0)	0 (0.0)	1.000

* Multiple responses

Table V Distribution of study population according to mode of delivery (N=100)

Mode of delivery	Group		P value
	Group A (n, %)	Group B (n, %)	
Vaginal delivery	22 (44.0)	23 (46.0)	0.841
Caesarean section	28 (56.0)	27 (54.0)	

Table VI Distribution of study population according to intra-partum maternal complications who delivered vaginally (N=100)

Intra-partum maternal complications	Group		P value
	Group A (n=22) (n, %)	Group B (n=23) (n, %)	
Cervical tear	2 (9.1)	3 (13.0)	0.673
Perineal tear	2 (9.1)	3 (13.0)	0.673
Shoulder dystocia	1 (4.5)	2 (8.7)	0.577

Table VII Distribution of study population according to their pregnancy outcome (100)

Pregnancy outcome	Group		P value
	Group A	Group B	
Live birth	39 (78.0)	41 (82.0)	0.617
Abortion	3 (6.0)	2 (4.0)	1.000
IUFD	6 (12.0)	5 (10.0)	0.749
Fresh stillbirth	2 (4.0)	2 (4.0)	1.000

There was no significant difference in post-partum maternal complications between group A (PGDM) and group B (GDM) who delivered by LUCS except wound infection (Table VIII). Wound infection was significantly high in PGDM group. No significant difference in post-partum maternal complications between group A (PGDM) and group B (GDM) who delivered by vaginally. There was no significant difference in hypoglycemia, birth asphyxia and RDS between two groups (Table IX). No significant difference regarding congenital malformation between group A and group B was found (Table X).

Table VIII Distribution of study population according to post-partum maternal complications (N=100)

Post-partum maternal complications	Group		P value
	Group A (n=28) (n, %)	Group B (n=27) (n, %)	
Delivered by LUCS			
PPH	4 (14.3)	3 (11.1)	1.000
UTI	6 (21.4)	8 (29.6)	0.485
Mastitis	3 (10.7)	2 (7.4)	0.670
Wound infection	10 (35.7)	3 (11.1)	0.032
Others	1 (3.6)	1 (3.7)	1.000
Delivered vaginally			
PPH	3 (13.6)	1 (4.3)	0.346
UTI	2 (9.1)	3 (13.0)	1.000

Multiple responses

Table IX Distribution of study population according to perinatal complications (N=100)

Perinatal complications	Group		P value
	Group A	Group B	
Hypoglycemia	11 (22.0)	4 (8.0)	0.049
Birth asphyxia	12 (24.0)	4 (8.0)	0.029
Hyperbilirubinemia	8 (16.0)	6 (12.0)	0.564
Macrosomia	1 (2.0)	4 (8.0)	0.169
RDS	12 (24.0)	4 (8.0)	0.029
Congenital malformation	4 (8.0)	1 (2.0)	0.362

* Multiple responses

Table X Distribution of study population according to congenital malformation (N=100)

Type of congenital malformation	Group		P value
	Group A	Group B	
Present	4 (8.0)	1 (2.0)	0.362

Discussion

In this study, there was no significant difference between PGDM and GDM regarding mean age of the study subjects. Maternal age was higher in PGDM than that of GDM in the study of Wahabi et al.²⁰ which is similar to this study. In a study of Clausen et al.²¹ shows that increasing age of the patients of GDM had been described as a risk factor for pregnancy complication.

There was statistical significant difference between PGDM and GDM in past bad obstetric history. History of GDM, IUD and abortion were significantly higher among PGDM patients than GDM patients. History of previous miscarriage was higher in PGDM than GDM.²⁰

Regarding present pregnancy complications, polyhydramnios, preterm delivery, vulvovaginitis and PROM were significantly higher in PGDM than GDM patients. In PGDM group 1 patient had oligohydramnios. Women with PGDM had a significantly higher incidence preterm deliveries comparing GDM.^{20,22} Incidence of Oligohydramnios was also higher in PGDM comparing GDM.²²

Caesarean section was more frequently needed in pre-gestational than gestation pregnant women. There was no statistical significant difference between PGDM and GDM. Wahabi et al.²⁰ revealed C/S was higher in PGDM than GDM.

Pregnancy outcome was less favourable in PGDM than GDM. The patients of PGDM lost 11 pregnancy and the patients of GDM lost 9 pregnancy; as stillbirth, IUFD and abortion. The still birth rate was higher in PGDM than GDM.²⁰

Regarding perinatal complications hypoglycemia, birth asphyxia and RDS were significantly higher in PGDM than GDM group, which is similar to the study of Abu-Heija et al.²², they found neonatal hypoglycemia were significantly high in PGDM. Macrosomia has been demonstrated to be the predominant adverse outcome in cases of GDM.²³

In this study, less significant difference were found between PGDM and GDM outcome. It may be mentionable that the study was done in a referral hospital, where the diabetic patients were well managed. So it is believed that, if the field of study was any where rather than referral hospital, the result of the same study would become remarkably different and significant.

Conclusion

The maternal and perinatal outcomes of pregestational diabetes mellitus were less favorable than those of gestational diabetes mellitus.

Conflict of interest: Nothing to declare.

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