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Adverse Perinatal outcomes in Pre-Gestational and Gestational Diabetes Mellitus in a tertiary care hospital of Lahore, Pakistan

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Article Details

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ABSTRACT

Pre-Gestational and gestational diabetes mellitus is associated with adverse perinatal outcome in women. The only preventive measure is strict glycemic control. The current study aims to investigate and report the adverse perinatal outcomes in women with pre-gestational and gestational diabetes mellitus. Methods: The cross-sectional survey was done at Department of Obstetrics and Gynecology Unit-III, Sir Ganga Ram hospital, Lahore, Pakistan. Hundred women were included in the study. Fifty women had pre-gestational diabetes and another 50 had gestational diabetes. All patients were put on insulin therapy. Ante-natal assessment of fetal wellbeing was done via ultrasonography and cardiotocography by consultant obstetrician. The baby weight, APGAR score, amount of liquor, congenital abnormalities, blood sugar levels and duration of stay in the neonatal unit were also recorded. Results: The percentage of congenital malformations was 14% among pre-gestational diabetics and 2% in gestational diabetics. Among these 100 women the frequency of congenital malformations is more among patients with pre-gestational diabetes mellitus (PGDM) than gestational diabetes mellitus (GDM). Macrosomia occurred in 30% of gestational diabetics and 12% of pre-gestational diabetics. The percentage of development of macrosomia is more in patients with pre-gestational diabetes mellitus (PGDM) than gestational diabetes mellitus (GDM). The percentage of perinatal death among pre-gestational diabetics was 4% while no death was observed among gestational diabetics. There were no significant differences in the other parameters of perinatal outcome among pre-gestational and gestational diabetics. Conclusion: Diabetes mellitus, either pre-gestational or gestational, predicts adverse perinatal outcome. Strict glycemic control in peri-conception period and during pregnancy, and appropriate assessment of fetal wellbeing leads to outcome approaching that of non-diabetic mothers.

INTRODUCTION

Diabetes mellitus is one of the most common metabolic disorders complicating pregnancy throughout the world 1. Diabetes complicates approximately 3-5% of all pregnancies 2. Diabetes mellitus (DM) diagnosed before pregnancy is called pre-gestational diabetes mellitus (PGDM). It can be Insulin dependent (Type-I) or non-insulin dependent (Type-II) [3]. Gestational diabetes (GDM) is defined as carbohydrate intolerance of variable severity with first onset or recognition during pregnancy [4].

Globally, it is estimated that 21.1 million (16.7%) live births in 2021 were associated with maternal diabetes [5]. Of these, 10.6% were due to pregestational type 1 (T1DM) and type 2 (T2DM) diabetes mellitus, 9.1% were due to T1DM or T2DM first detected in pregnancy and 80.3% were due to GDM, a milder form of hyperglycemia that develops in the second trimester[5]. The number of women with GDM has increased during recent decades in United States. In a study using the National Hospital discharge survey data base, the estimated prevalence of GDM in United States was 5.8% in 2008-2010 [6]. The PGDM is one of the most common diabetic chronic conditions affecting pregnancy in the UK. 1 in every 250 pregnancies is complicated by PGDM [7]. In the last two decades, several research studies have been conducted in Pakistan that measured the proportion of GDM in women or compared the diagnostic accuracy of GDM screening tools. These single-center hospital-based studies utilized one of the standard screening methods and reported a prevalence rate varying from 4.41% to 57.90% [8,9].

Poor diabetic control in peri-conception period and early pregnancy resulted in congenital malformations which subsequently resulted in high perinatal morbidity and mortality [2]. The percentage of development of fetal malformations, fetal complications like spontaneous miscarriages, macrosomia, congenital malformations like anencephaly, spina bifida and cardiac abnormalities are more in pre-gestational than gestational diabetics [10,11]. The risk of development of late fetal complications like macrosomia, unexplained fetal death and neonatal complications is equal in PGDM and GDM. The aim of this study is to investigate the perinatal outcome in women with PGDM and GDM to enhance the importance of strict glycemic control for good perinatal outcome in diabetic women.

MATERIALS AND METHODS

The cross-sectional survey of perinatal outcome in PGDM and GDM was conducted in Obstetrics and Gynecology Unit-III, Sir Ganga Ram Hospital in city of Lahore which is a tertiary care teaching hospital. A total of 100 women were included in the study. Out of these, 50 had PGDM, and another 50 had GDM. Women with PGDM i.e., type-I and type-II and women with GDM were included in the study. Women without diabetes mellitus i.e., pre-gestational and gestational and those with impaired glucose tolerance before pregnancy and during pregnancy were excluded from the study. Pre-gestational diabetic women were admitted in Gynecology ward Unit-III at booking visit. After detailed history and clinical examination their blood sugar levels were done. Control of blood sugar was advised on diet and insulin therapy. They were discharged after teaching them administration of insulin and signs and symptoms of hypoglycemia. The aim was to keep fasting levels ≤ 5.8 mmol/L and after meal levels ≤ 7.8 mmol/L. Patients were followed at antenatal clinic with reports of fasting and post-prandial blood sugar levels fortnightly. At each visit, maternal and fetal wellbeing was assessed by blood sugar levels, ultrasonography and cardiotocography. Patients were re-admitted if complications were found and managed accordingly. Women with GDM, after diagnosis with oral glucose tolerance

test were followed fortnightly for feto-maternal assessment. Both PGDM and GDM mothers beyond 28 weeks of gestation were monitored using ultrasonography and cardiotocography. Key obstetric outcomes, including gestational age at delivery, mode of delivery, and intrapartum complications, were recorded. Neonatal parameters such as birth weight, APGAR scores, amniotic fluid volume, and presence of congenital anomalies, blood glucose levels, and duration of stay in the neonatal unit up to one week post-delivery were also documented. All data were collected using a structured proforma. Statistical analysis was performed using SPSS Version 20. Frequencies and percentages were calculated for the various maternal and neonatal outcomes.

RESULTS

TABLE-1: AGE DISTRIBUTION OF SUBJECTS UNDER STUDY

Age	Pre-Gestational DM		Gestational DM	
	Numbers	Percentages	Numbers	Percentages
< 35 years	46	92%	20	40%
>35 years	4	8%	30	60%
Total cases	50	100%	50	100%

Result in above table indicate that there were more patients with age > 35 years in GDM while there were more patients with age < 35 years in PGDM.

TABLE-2: POLYHYDRAMNIOS-A COMPARISON IN PGDM AND GDM

Type	Total cases Numbers	Polyhydramnios Numbers	Percentages
PGDM	50	4	8%
GDM	50	1	2%

Results indicate that percentage of polyhydramnios is more in PGDM than GDM.

TABLE-3: ASSOCIATION OF CONGENITAL MALFORMATION WITH DIABETES MELLITUS

Type	Total cases Numbers	Congenital malformation Numbers	Percentages
PGDM	50	7	14%
GDM	50	1	2%

The percentage of development of congenital malformation is more in PGDM as compared to GDM

TABLE-4: PRE- MATURE LABOR. PRE-GESTATIONAL VS GESTATIONAL DIABETES MELLITUS

Parameters	Pre-Gestational DM		Gestational DM	
	Numbers	Percentages	Numbers	Percentages
Premature labour	3	2%	1	6%
Total cases	50		50	

The percentage of development of premature labor is more in GDM as compared to PGDM.

TABLE5: ASSOCIATION OF MACROSOMIA IN PRE-GESTATIONAL AND GESTATIONAL DIABETICS

Type of D.M	Total cases	Macrosomia Numbers	Percentages
Pre-gestational DM	50	6	12%

Gestational DM	50	15	30%

The percentage of development of macrosomic babies was more in gestational diabetics as compared to pre-gestational diabetics.

TABLE6: OCCURRENCE OF LATE INTRA-UTERINE DEATHS (IUDS) IN DIABETES MELLITUS

Type of D.M	Total cases	Intra-uterine deaths	
		Numbers	Percentages
Pre-gestational DM	50	1	2%
Gestational DM	50	0	0%

The percentage of development of occurrence IUD is more in PGDM as compared to GDM.

TABLE-7: VAGINAL DELIVERIES VS CAESAREAN SECTION IN DIABETES MELLITUS

Type of D.M	Total Cases	Vaginal Delivery		Caesarean Section	
		Numbers	Percentages	Numbers	Percentages
Pre-gestational DM	50	10	20%	40	80%
Gestational DM	50	13	26%	37	74%

The percentage of occurrence of C-section deliveries is slightly more in PGDM as compared to GDM.

TABLE-8: COMPARISON OF APGAR SCORE OF BABIES AT DELIVERY AMONG PRE-GESTATIONAL DIABETICS AND GESTATIONAL DIABETICS

APGAR score	Pre-Gestational DM		Gestational DM	
	Numbers	Percentages	Numbers	Percentages
> 5/10	48	96%	43	86%
< 5/10	2	4%	7	14%
Total cases	50	100%	50	100%

TABLE9: NEONATAL HYPOGLYCEMIA- A COMPARISON AMONG PRE-GESTATIONAL AND GESTATIONAL DIABETICS

Type of D.M	Total cases	Macrosomia	
		Numbers	Percentages
Pre-gestational DM	50	3	6%
Gestational DM	50	1	2%

The percentage of occurrence of neonatal hypoglycemia is slightly more in PGDM as compared to GDM.

TABLE-10: COMPARISON OF ADMISSION IN NEONATAL UNIT AMONG BABIES OF PRE-GESTATIONAL DIABETICS AND GESTATIONAL DIABETICS

Admission in neonatal unit	Pre-Gestational DM		Gestational DM	
	Numbers	Percentages	Numbers	Percentages
< 24 hours	40	80%	46	92%
> 24 hours	10	20%	4	8%
Total cases	50	100%	50	100%

The percentage of admission in less than 24 hours to neonatal unit is slightly more in PGDM as compared to GDM and vice versa for more than 24 hours.

TABLE-11: PERCENTAGE OF PERINATAL DEATHS OF BABIES OF MOTHERS WITH PRE-GESTATIONAL DIABETICS AND GESTATIONAL DIABETICS

Type of D.M	Late Intrauterine Deaths		Early Neonatal Deaths	
	Numbers	Percentages	Numbers	Percentages
Pre-gestational DM	1	2%	1	2%
Gestational DM	0	0%	0	0%
Total cases	50	100%	50	100%

Percentage of perinatal deaths is defined as percentage of intrauterine deaths plus percentage of neonatal deaths. The percentage of occurrence of early and late IUDs is slightly more in PGDM as compared to GDM.

DISCUSSION

This cross-sectional study was conducted to assess perinatal outcomes in pregnancies complicated by pre-gestational diabetes mellitus (PGDM) and gestational diabetes mellitus (GDM), with the aim of emphasizing the importance of strict glycemic control for optimal maternal and neonatal health. Diabetes complicates approximately 1–5% of all pregnancies. In Pakistan, the incidence of GDM ranges from 1–5%, with a reported prevalence of 3.2% [13].

Pregestational diabetics are diagnosed prior to conception and are at a higher risk of feto-maternal complications. In contrast, gestational diabetes is typically diagnosed during the second trimester, often resulting in a relatively lower risk of early adverse fetal outcomes. However, the incidence of late fetal and neonatal complications is nearly equal in both PGDM and GDM groups.

Ideally, universal screening for diabetes in pregnancy should be practiced. However, in low-resource settings such as ours, this is limited by the high cost and lack of diagnostic facilities. Consequently, only high-risk pregnant women were screened in this study using a diagnostic oral glucose tolerance test (OGTT). This introduces a limitation to the study, as cases of GDM without overt risk factors may have been missed. Moreover, the glucose challenge test, considered the gold standard for GDM screening, was not employed due to cost constraints. Instead, a random blood sugar level was used, which is more affordable and widely accessible. Nevertheless, the results obtained in this study align with both national and international standards.

In the current study, 92% of PGDM patients were below 35 years of age, while 60% of GDM patients were above 35 years. These findings are comparable to studies conducted at Laval University, Canada, and the University of Mitano, Italy [14]. Polyhydramnios occurred in 8% of PGDM cases and 2% of GDM cases, consistent with findings from the University of Texas, USA [15]. Congenital malformations were observed in 14% of PGDM and 2% of GDM cases, again aligning with the Texas study [16,17].

Premature labor occurred in 6% of PGDM and 2% of GDM patients, a trend also seen in the Sanora Medical Center study [18]. Macrosomia was noted in 12% of infants born to PGDM mothers and in 30% of those born to GDM mothers, findings comparable to research conducted in Australia [19]. Late intrauterine death was observed in 2% of PGDM cases, while no such cases occurred in the GDM group—similar to outcomes reported from Sundsvall Hospital, Sweden [11,22].

Caesarean delivery was required in 80% of PGDM and 74% of GDM cases, which corresponds with findings from studies conducted in Spain and published in the *Journal of Obstetrics and Gynecology* [20,21]. In terms of neonatal outcomes, 96% of babies born to PGDM mothers and 86% of those born to GDM mothers had APGAR scores >5/10, while 4% and

14%, respectively, had scores <5/10 [23]. Neonatal hypoglycemia was reported in 6% of PGDM and 2% of GDM infants, mirroring the findings of DC-Sturrock et al. [24].

Eighty percent of PGDM infants and 92% of GDM infants were admitted to the neonatal unit for less than 24 hours, while 20% and 8%, respectively, required admission for more than 24 hours [24]. This may be attributed to intrauterine hyperglycemia prior to treatment, which increases the risk of neonatal complications. The perinatal mortality rate in PGDM was 2%, while no perinatal deaths occurred in the GDM group [25].

Although the sample size in this study was limited, the frequency of maternal and neonatal complications observed in both PGDM and GDM groups is consistent with findings from previous studies, indicating a degree of reliability. As this was a cross-sectional survey, both exposure (diabetes status) and outcome (perinatal complications) were assessed simultaneously, limiting the ability to establish temporality or causality. Future research should focus on well-designed prospective studies with larger sample sizes to better determine the optimal blood glucose levels necessary for improved perinatal outcomes.

CONCLUSION

The frequency of adverse perinatal outcome is more in PGDM than GDM. Awareness of blood glucose levels in Pre-pregnancy period is highly recommended to prevent unfavorable outcomes.

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