Study of the Effects of Gestational Diabetes on Pregnant Mothers and their New-Born Babies in a Medical College in West Bengal

Sudipta Pramanick[1], Pulak Panda[2]

ABSTRACT

Introduction: Diabetes is one of the most common medical complications in pregnancy. It complicates two to five percent of all pregnancies, of which 90% is contributed by gestational diabetes mellitus (GDM). It is utmost essential to screen for GDM in pregnancy because glucose intolerance is associated with adverse maternal and neonatal outcomes. Women with history of GDM, and their children are at risk of developing diabetes in future.

Material and methods: In this prospective, case-control study in a tertiary care hospital, 50 GDM pregnant women were taken as cases and 50 non-GDM pregnant women as controls.The criteria used for diagnosing GDM was that if the 2 h venous plasma glucose measured after 75 g oral glucose load in non-fasting state was >140 mg/dl (DIPSI criteria) the patient was stamped as GDM.The cases and controls were followed till delivery. Data was collected by interview and laboratory investigations and other hospital records by using a standard set of questions.

Result: GDM mothers were significantly older, and had higher BMI;significantly higher incidence of LSCS and association with hypothyroidism was found.Hypoglycaemia, >24hrs admission in NICU and mean Apgar score at 1 minute were significant findings in new-borns of GDM mothers. However, complications such as polyhydramnios, oligohydramnios, hypocalcemia and jaundice in the neonate, were similar in both groups. Congenital anomalies were not found and perinatal mortality and pretem delivery rates were not significantly different in the two groups.

Conclusion: GDM is associated with increased rates of adverse maternal and neonatal outcomes, which are further supported by the findings of this study. Even the mild form of GDM have significant adverse consequences for women and their offspring and is better to be aggressively treated.

Keywords: Gestational Diabetes Mellitus, Maternal Outcome, Neonatal Outcome, OGTT (DIPSI).

INTRODUCTION

Diabetes is one of the most common medical complications of pregnancy. It complicates two to five percent of pregnancies, of which 90% is contributed by gestational diabetes mellitus (GDM).[1] Insulin resistance is a result of the metabolic changes of late pregnancy, and the increased insulin requirements may lead to impaired glucose tolerance (IGT) or gestational diabetes.[2] Gestational diabetes is defined as carbohydrate intolerance of variable severity with onset or first recognition during pregnancy (American College of Obstetricians and Gynecologists, 2013). This definition applies whether or not insulin is used for treatment and undoubtedly includes some women with previously unrecognized overt diabetes.[3] It is utmost essential to screen for GDM in pregnancy because glucose intolerance is associated with adverse maternal and neonatal outcomes and women with history of GDM, and their children are at risk of developing diabetes in future.[4,5] The hyperglycemia and adverse pregnancy outcomes study involving 25, 505 pregnant women (HAPO study) showed that the risk of adverse maternal, fetal, and neonatal outcome increased even within ranges previously considered normal for pregnancy.[6] It is estimated that about 4 million women are affected by GDM in India, at any given time point.[7] In India, a community based study involving 12, 056 pregnant women found the prevalence of GDM to be 13.9%.[8] Hence, screening for GDM during pregnancy, has become necessary.

In India, significant work by Seshiah et al. lead to the adoption of Diabetes in Pregnancy Study Group in India (DIPSI) criteria as the widely recommended guideline to diagnose GDM, especially in the community setting. Importantly the recent National Institute of Clinical Excellence (NICE) guidelines also recommends 2hr PG> 140 mg/dl to diagnose GDM very similar to DIPSI guidelines.[9] The objective of our study was to list maternal complications and outcomes in GDM, and to identify the neonatal morbidities associated with this condition.

MATERIAL AND METHODS

The present study was conducted at the post natal ward and NICU (if required) in the Department of Obstetrics and Gynaecology at a medical college hospital, in South Kolkata, West Bengal. Ethical clearance was obtained from respected authority. A total of 30 pregnant women who were diagnosed as GDM and have delivered between 2014 and 2016 were selected for this study. The inclusion criteria were pregnant women with diagnosed GDM, who have recently delivered. Pregnancy with major chronic diseases like carcinoma, tuberculosis, congestive cardiac failure (CCF), renal failure, and liver failure etc., malposition/ malpresentation, multiple pregnancy, any co-existent surgical illness were excluded from the present study. 20 HPW (healthy pregnant woman) who did not have GDM, and have delivered during the same period, were selected as control. A standard questionnaire was used, and details pertaining to age, body weight at booking visit, family history of Diabetes, medical and obstetric history, comorbidities (hypertension, hypothyroidism etc.), BMI, BP and details of the new-born, such as birth weight, gestational age (GA) at delivery, mode of delivery, apgar score at 1 and 5 minutes, NICU admission >24 hrs, other metabolic events (hypoglycaemia, hyperbilirubinemia, hypocalcemia etc.) were recorded. Prior informed consent was taken from the mothers.

[1]Post Graduate Trainee, [2]Professor and HOD, Department of Physiology, KPC Medical College & Hospital, Jadavpur, Kolkata, India

Corresponding author: Sudipta Pramanick, 8/1 Phanindralal Some Street, PO Bhadrakali, Dist Hooghly, PIN-712232, India

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The criterion used was if the 2 h venous plasma glucose measured after 75 g oral glucose load in non-fasting state was >140 mg/dl (DIPSI criteria) after 24th completed weeks of pregnancy, the patient was labelled as GDM. Recently a study performed by Wahi et al. also highlighted the advantages of adhering to DIPSI guidelines in the diagnosis (2-h PG ≥ 7.8 mmol/L) and management of GDM for a significantly favourable outcome on pregnancy.[10] In India more than 70% of population live in rural scenario and facilities for diagnosing diabetes itself is limited. In this scenario, performing OGTT recommended by other associations [e.g., ADA, NDDG, IADSPG] to diagnose GDM is not possible as the cost involved is impractical to perform three blood tests and thus not advocated by both health care providers and seekers.

STATISTICAL ANALYSIS

Results were expressed as number and percentages. Student t test for proportions was used for comparing the GDM and control groups as well as the newborns of GDM and control groups. Calculated P-value <0.05 were considered to be significant.

RESULTS

46% of GDM mothers had positive family history for diabetes as compared to 20% in the control group. 66 % of GDM mothers were multiparous, as compared to 40 % of control group. Both the above two observations were statistically insignificant. Mean BMI and age of GDM mothers at delivery were 31 and 26.5 respectively, as compared to 23.8 and 22.5 in control group (Table-1).

As far as the maternal outcome is concerned significant number of LSCS was performed in GDM group (P=0.00644). Associated polyhydramnios and oligohydramnios was insignificant. Though concomitant hypertension was insignificant, association with hypothyroidism was statistically significant (P=0.00467) (Table-2).

No statistically significant difference in mean gestational age at delivery, mean birth weight of the new-borns, associated hypocalcemia, jaundice, macrosomia, shoulder dystocia, congenital abnormality or preterm delivery was found. Statistically significant hypoglycaemia (P=0.04), neonates requiring >24hrs admission to NICU (P=0.00183) and mean apgar score at 1 minutes (P=0.001286) were found (Table 3).

DISCUSSION

Several studies report a strong relationship between GDM and advancing maternal age.[11,12] Pre-pregnancy weight is also an established risk factor for GDM.[13] A positive correlation between maternal body weight and risk of developing GDM was observed in studies by Seshiah et al.,[14] and Chu et al.[15] Similar study from South India showed age>25 years as a risk factor for GDM.[20] In our study, mean age of GDM mothers were 31 vs 23.8 in the control group, and the difference of BMI (26.5 vs 22.5) were both statistically significant. Some studies have also attributed the risk of unfavourable outcomes associated with GDM to confounding characteristics such as obesity and advanced maternal age of women with GDM.[11,16] The Hyperglycemia and Adverse Pregnancy Outcome (HAPO) study showed that lifestyle factors and obesity contribute significantly to the increasing incidence of GDM.[6] Goldman et al.,[17] reported cesarean section rates of 35.3% in women with GDM in United States with similar reports from Casey et al.[18] Along with the parallel increase in GDM, these rates have also increased over the years. 86 % women in the present study has undergone a cesarean section, with the most common indications being arrest of labor and post LSCS pregnancy. Our study demonstrated that 6 % of newborns of GDM mothers were macrosomics as opposed to 0% in the non-GDM group. Hong et al. also found an incidence of 6.5% of macrosomia in the GDM group.[19] The incidence of hypoglycemia and hyperbilirubinemia were 26 % and 20%, respectively, which were bit higher compared to observations of a case control study done in Brazil.[20] The incidence of hypoglycemia and hyperbilirubinemia in that study were 16.3% and 6.1%, respectively.

Parameters	GDM (n=50)	Control (n=50)	P-value	T-value	Significance
F/H of GDM (%)	23/50=46%	10/50=20%	0.094	1.356	NS
Religion (H/M)	H-47/M-3 94%/6.%	H-35/M-15 70%/30%	-	-	-
Multiparity	33/50=66%	20/50=40%	0.102	1.3	NS
Mean Age of mothers at Delivery (yrs)	31	23.8	0.000022	5.02	SIG
Mean BMI (Kg/Mt2)	26.5	22.5	0.000223	4.09	SIG
(P value significant at P<0.05; NS=Not Significant; SIG=Significant; H=Hindu; M=Muslim)					

Table-1: Demographic comparison of women with gestational diabetes mellitus (GDM) and a control group (Control) without gestational diabetes mellitus.

Parameters	GDM (n=50) group	Control (n=50) group	P-value	T-value	Significance
Seen by Endocrinologist (%)	33/50=66%	0/50=0%	0.000137	4.29	SIG
LSCS (%)	43/50=86%	20/50=40%	0.00644	2.7	SIG
Associated Gestational Htn (%)	3/50=6%	0/50=0%	0.213	0.81	NS
Associated Hypothyroidism (%)	23/50=46%	0/50=0%	0.00467	2.837	SIG
Polyhydramnios (%)	3/50=6%	0/50=0%	0.213	0.810	NS
Oligohydramnios (%)	0/50=0%	0/50=0%	-	-	-
(P-value significant at P<0.05 (Student T-Test for calculating two independent Means; LSCS = Lowersegment caesarean section; GA = Gestational Age; NICU = Neonatal Intensive care Unit.)					

Table-2: Comparison of maternal outcomes between the group with GDM and the control population.

Parameters	GDM (N=50) group	Control (N=50) group	P-value	T-value	Significance
Mean GA of neonates at delivery (weeks)	36.63	36.23	0.27	0.622	NS
Mean Birth Weight of Neonates (kg)	2.79	2.59	0.205	0.84	NS
Hypoglycemia in neonates (%)	13/50=26%	0/50=0%	0.04	1.83	SIG
Hypocalcemia in neonates (%)	0	0	-	-	-
Neonates requiring Phototherapy (%)	10/50=20%	5/50=10%	0.262	0.647	NS
Neonates requiring NICU admission >24 Hrs. (%)	33/50=66%	5/50=10%	0.00183	3.235	SIG
Mean Apgar score at 1 minute	7.33	8.4	0.001286	-3.38	SIG
Mean Apgar score at 5 minute	9.2	9.5	0.0964	-1.34	NS
H/O Perinatal loss (%)	13/50=26%	10/50=20%	0.2	0.86	NS
Macrosomia (%)	3/50=6%	0/50=0%	0.213	0.81	NS
Shoulder Dystocia (%)	0/50=0%	0/50=0%	-	-	-
Congenital abnormality (%)	0/50=0%	0/50=0%	-	-	-
Preterm Delivery (%)	30/50=60%	30/50=60%	0.13	1.16	NS
(P-value significant at P<0.05 (Student T-Test for calculating two independent Means; LSCS = Lowersegment caesarean section; GA = Gestational Age; NICU = Neonatal Intensive care Unit.)					

Table-3:Comparison of fetal outcomes between the group with GDM and the control population.

In the present study hypothyroidism were observed more in GDM group (46 %), which is expected, although this may not reflect a true picture, as routine screening for hypothyroidism was not performed for all diabetic pregnancies. Endocrinopathies like hypothyroidism is known to be associated with diabetes.[21] In the present study most of the neonates of GDM mothers were transferred to NICU for blood sugar monitoring and further biochemical investigations to identify neonatal complications associated with diabetes, as indicated by the significant number of NICU admission >24hrs (P=0.00183). None of our babies had other statistically significant adverse outcomes related to diabetes, like macrosomia, respiratory distress syndrome (RDS), polycythemia, preterm delivery, congenital anomalies or stillbirth. The high rates of these neonatal complications have been identified as a marker of poor glycemic control in the mother. The increased risk of severe malformations is the consequence of poorly controlled diabetes, both pre-conceptionally and early in pregnancy.[3] Higher perinatal mortality rate in uncontrolled gestational diabetes has been reported previously. However, among our diabetic patients, there was no significantly increased perinatal mortality and no congenital malformation in the fetus.

CONCLUSION

Women with GDM are at an higher risk for adverse obstetric and perinatal outcomes. Age >25 years, obesity, family history of Diabetes Mellitus, and past history of GDM are significant risk factors in GDM population. Good maternal and neonatal outcomes result from early and thorough prenatal and intranatal care as documented in our study. Although eradication of GDM is not possible, we can practically prevent its adverse effects on pregnancy outcome. Treatment of GDM prevents future DM in the mother and also acts as prevention for future DM in the child to be born. Opening of maternal–infant centers with standard recommended protocols for prevention and treatment of diabetes in pregnancy on a national scale will go a long way in reducing the ill effects of this condition.

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