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MATERNAL AND PERINATAL OUTCOME IN GESTATIONAL DIABETES AMONG LOW SOCIOECONOMIC STATUS: A CASE-CONTROL STUDY

Dr. Ruby Kumari
Senior Resident, Department of Obstetrics and Gynecology, Government Medical College and Hospital, Bettiah, Bihar, India

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Corresponding author: Dr. Ruby Kumari
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Abstract

Aim: to determine the maternal and perinatal outcome in GDM during pregnancy.

Materials and Methods: This prospective observational study was carried out in the Department of Obstetrics and Gynecology in Government Medical College and Hospital, Bettiah, Bihar, India from March 2018 to July 2019. Total 400 patients were included into the study. 200 GDM patients who were managed and delivered taken as cases and another 200 women with normal profile patients without GDM who delivered during the same time were taken as controls. The baseline characteristics (age, body mass index, religion, and socioeconomic status) were noted in all cases. Diagnosis of GDM was made using oral glucose tolerance test with 75 g glucose. GDM patients were started on diet following which insulin or oral hypoglycaemic agents were given if required. Maternal and perinatal outcome was noted in all women.

Results: The prevalence of GDM was 4.65% (200/4300). Most patients 162(81%) could be controlled on diet alone. However, 21 (10.5%) needed insulin and 17 (8.5%) needed oral hypoglycaemic agents. lower and Middle socioeconomic status was more common in GDM than control and pregnancy induced hypertension was more common in GDM 39(19.5%) than in control 14 (7%) (P = 0.014). Mode of delivery was not different in two groups. Instrumental deliveries and postpartum haemorrhage were also similar. However, mean birth weight was significantly higher in GDM (2891.81±531.31g) than in control (2721.73±639.66g) (P = 0.002).

Conclusion: The prevalence of GDM was 4.65 % in this study. Adequate treatment of GDM on diet, oral hypoglycaemic agents, or insulin to achieve euglycemia can achieve near normal maternal and neonatal outcome.

Keywords: Gestational diabetes mellitus, oral glucose tolerance test, perinatal complication, prevalence

Introduction

Gestational diabetes mellitus (GDM) is defined as "hyperglycemia first detected during pregnancy that is clearly not pre-existing or overt diabetes".[1] It is believed to be the drastically increased prevalence of GDM had a negative impacts on various short- and long-term maternal and neonatal adverse outcomes.[2,3] According to the World Health Organization gestational diabetes mellitus (GDM) is a degree of glucose intolerance with onset or first recognized during pregnancy.[4] It's prevalence rate varies from 2% to 22% of all pregnancies because of the use of different criteria for diagnosis.[5] It constitutes 90%–95% of all cases of diabetes seen in pregnant women.[6] Many controversies exists related with the screening, diagnostic tools, and glucose level threshold use due to the use of different criteria followed by the different organisation.[5] Many studies report maternal and fetal outcomes related with complications in GDM but were flawed due to a number of confounding factors like older maternal age, obesity, and various other comorbidities.[7] The most convincing evidence of adverse pregnancy outcome in gestational diabetes was provided by hyperglycemia.[8] In a study The tolerance test (GTT) was performed with fasting ≥92 mg, 1 h ≥180 mg/dl, and 2 h ≥153 mg/dl plasma glucose values are taken as GDM.[9] In India, study by Seshiah *et al.*, a community-based study on the prevalence of GDM in South India was performed and they came up with Indian guidelines for GDM which are commonly used in Indian condition.[10] The aim of the present paper was to evaluate the maternal and perinatal outcomes in gestational diabetes in low socioeconomic groups.

Material and methods

This prospective observational study was carried out in the Department of Obstetrics and Gynecology in Government Medical College and Hospital ,Bettiah, Bihar, India from march 2018 to july 2019.

The study protocol was reviewed by the Ethical Committee of the Hospital and granted ethical clearance.

Grouping

200 GDM patients who were managed and delivered and another 200 women with normal profile patients without GDM who delivered during the same time were taken as controls.

Methodology

Baseline characteristic of women including age, body mass index (BMI), socioeconomic status, and religion was recorded. Diagnosis of GDM was made by GTT using 75 g glucose. Patient were labelled as GDM if any one value is more than criteria (fasting blood sugar [BS] ≥92 mg/dl, 1 h BS ≥180 mg/dl, and 2 h BS ≥153 mg/dl). Initially, patients were started on diabetic diet with some physical exercises. Diet was started by a dietician. If BS levels were not controlled on diabetic diet, then women were either started on oral hypoglycaemic agent or insulin in collaboration with endocrinologist. The women received regular antenatal care. All antenatal investigations were performed. All women were screen for Down's syndrome using Level I ultrasound and dual screen followed by triple screen. Level II ultrasound (anomaly screen) was performed at 18–20 weeks in all patients. Any antenatal complications were noted and treated, particularly urinary tract infection (UTI), candidiasis, preeclampsia, polyhydramnios, etc. As a protocol, all patients with GDM on insulin were induced at 38 weeks, and those controlled on diet were induced at 40-week period of gestation.

Statistical Analysis

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2010) and then exported to data editor page of SPSS version 19 (SPSS Inc., Chicago, Illinois, USA). Descriptive statistics included computation of percentages. The statistical test applied for the analysis was Pearson's chi-square test (χ^2) and student t-test. The confidence interval and p-value were set at 95% and ≤ 0.05 respectively.

Results

Table 1: Method of diagnosis and the modes of treatment for gestational diabetes mellitus

Method of diagnosis	GDM N (%)
Fasting blood sugar	153(76.5%)
1h	83 (41.5%)
2h	67(33.5%)
Modes of treatment for gestational diabetes mellitus	
Diet	162(81.0%)
Insulin	21(10.50%)
Oral hypoglycemic agents	17(8.5%)
Total	200(100.0%0

Table 2: Baseline characteristics of Cases and Control

Baseline characteristics	GDM (N=200)	NON-GDM (N=200)	P-value
BMI(kg/m^2±SD)	24.5±41	24.7±4.3	0.688 (NS)
Age			
Below 20 years	19(9.5%)	29(14.5%)	0.880 (NS)
20-30 years	122(61%)	135(67.5%)	
30-40 years	37(18.5%)	31(15.5%)	
Above 40 years	22(11%)	5(2.5%)	
Socioeconomic status			
Lower	128(64%)	104(52%)	0.001 (Sig.)
Middle	59(29.5%)	51(25.5%)	
Upper	13(6.5%)	45(22.5%)	
History of diabetes in family	55(27.5%)	30(15%)	0.001 (Sig.)

Table 3: Maternal Complications in GDM and Non GDM Patients

Complication	GDM (N=200)	NON-GDM (N=200)	P-value
UTI	27(13.5%)	18(9.0%)	0.39
Gestational hypertension/preeclampsia	39(19.5%)	14(7.0%)	0.014
Polyhydramnios	3(1.5%)	0	0.21
Vaginal candidiasis	9(4.5%)	4(2.0%)	0.23

Table 4: Maternal Outcomes in both cases and controls

Variables	GDM (N=200)	NON-GDM (N=200)	P-value
Preterm delivery	15(7.5%)	9(4.5%)	0.005 (Sig.)
Mode of delivery			
Vaginal	124(62%)	85(42.5%)	0.293 (NS)
Caesarean	76(38%)	115(57.5%)	0.341 (NS)
Instrumental	7(3.5%)	9(4.5%)	0.271 (NS)
Primary postpartum haemorrhage	3(1.5%)	2(1%)	0.583 (NS)
Postpartum sepsis	5(2.5%)	3(1.5%)	0.592 (NS)

Table 5: Perinatal Outcomes in both cases and controls

Variables	GDM (N=200)	NON-GDM (N=200)	P-value
Baby Weight (Grams)	2891.81±531.31	2721.73±639.66	0.020 (Sig.)
Apgar 1 min	8.17±1.29	8.09±0.81	0.891 (NS)
Apgar 5 min	8.59±1.39	8.67±0.82	0.412 (NS)
Distribution of baby weight with Reference to standard weight (%)			
AFD	141(70.5)	160(80%)	0.002 (Sig.)
LFD	51(25.5%)	33(16.5%)	
SFD	8(4)	7(3.5%)	
Hypoglycemia (%)	45(22.5%)	17(8.5%)	0.001 (Sig.)
Hyperbilirubinemia (%)	9(4.5%)	8(4%)	0.635 (NS)
Respiratory distress syndrome (%)	11(5.5%)	4(2%)	0.079 (NS)
Congenital anomaly (%)	8(4 %)	3(1.5%)	0.076 (NS)

Discussion

Gestational diabetes mellitus (GDM) is common problem in pregnancy.[4,5] Overt diabetes mellitus is well known to have adverse antenatal and neonatal outcome. However, controversies exist regarding adverse effects of GDM due to the use of different criteria used by different studies and various confounding factors in these studies.[7] However, the HAPO study confirmed adverse maternal and fetal outcome with rising blood glucose levels in the form of large for date, caesarean delivery rate, and neonatal hypoglycaemia as a primary outcome and preeclampsia, preterm delivery, shoulder dystocia, birth injury, hyperbilirubinemia, and intensive neonatal care as secondary outcome. All primary outcome and secondary outcome were affected with maternal hyperglycemias and the prevalence of complication was directly proportional to rising blood glucose levels.[8] Most guidelines have been developed taking results of HAPO study in consideration including Indian guidelines by Seshiah et al.[10,11]

The incidence of GDM in the present study was found to be 4.65 % which was lower than that of 13% by Nair et al.[12] from Kolkata, Bengaluru, and Pune and similar to 7.17% by Rajput et al.[13] from Rohtak, Haryana and higher than that of 3.8% by Zargar et al.[14] from Kashmir. However, Seshiah et al.[11] in a study found the prevalence of GDM to be very high being 17.8% in urban, 13.8% in semiurban, and 9.9% in rural area of Tamil Nadu. In the present study, GDM was found to be higher in middle and lower socioeconomic class, but Rajput et al.[13] observed higher prevalence in low socioeconomic class. History of diabetes in family was significantly higher in GDM cases in the present study as compared to controls. Similar results were obtained by Nair et al.[12] In the present study, antenatal complications such as gestational hypertension and preeclampsia were significantly higher as compared to controls. The results are similar to Nair et al.[12] and HAPO study.[8]

In the present study, there was no significant difference in mode of delivery (cesarean delivery and instrumental delivery) in GDM as compared to controls, an observation also reported by HAPO study [9] and Nair et al.[12] In perinatal outcome, mean birth weight was significantly higher (2891.81±531.31g) in GDM cases as compared to controls (2721.73±639.66 g) p= 0.020). Similarly, large-for-date babies were significantly higher in GDM patients than control (51(25.5%) vs. 33(16.5%), p=0.002). There was significantly higher incidence of neonatal hypoglycemia in GDM patients than control (45(22.5%) vs. 17(8.5%), p= 0.001). However, there was no significant difference in Apgar scoring, congenital malformation, and neonatal hyperbilirubinemia in the two groups. The results were similar to that of Nair et al.[12] and Djomhou et al. from Cameroon,[5] who observed increased incidence of macrosomia in their study. Other authors and a systematic review of WHO and International association of diabetes and pregnancy study group of India diagnostic criteria observed adverse maternal and perinatal outcome, especially macrosomia and neonatal hypoglycemia in GDM patients as compared to controls.[15-17] In a Californian, study by Sacks et al.[18] found prevalence of GDM to be 17.8% (9.3%–25.5%) and adverse perinatal outcome in these patients. In another study from New York, USA, Most et al.[19] observed adverse perinatal outcome in women diagnosed to have GDM in the early pregnancy, and the adverse pregnancy outcome was present despite early identification and management of GDM due to greater severity of disease.[12,19] In a study conducted in diabetes care centre in Chennai, India, using Diabetes in Pregnancy Study Group of India criteria, Balaji et al.[20] observed an incidence of 13.4% of GDM in pregnancy and need of insulin to be in 9.7% which was similar to need of insulin in 21(10.50%) in our study. Nair et al.[12] observed most complication including macrosomia, fetal distress, birth injuries, and dystocia could be reduced significantly by adequate glycemic control in the antenatal period. We also observed very slight increase in parameters including large-for-date babies, birth weight, and neonatal hypoglycaemia in GDM patients but most other parameters such as mode of delivery, neonate Apgar, and instrumental deliveries were similar in the two groups due to adequate control of BSs by diet control, insulin, and oral hypoglycaemic agents. Similar observation was made by Kwik et al.[21] Similarly, respiratory distress syndrome and hyperbilirubinemia in the present study were similar to control levels due to proper control of GDM by maintaining euglycemia and using maternal steroid for fetal pulmonary maturation in women at risk of premature babies. Mitanchez et al.[22] observed that untreated moderate or severe GDM increased the risk of fetal and neonatal complications. However, the risk of neonatal complication and macrosomia was minimal with adequate treatment. They found a relationship between maternal blood glucose levels and increased birth weight. Treatment of GDM reduces the risk of macrosomia and adverse neonatal outcome.

Conclusion

There is a higher prevalence of GDM in India which varies from area to area and socioeconomic status. Adequate treatment of GDM on diet, oral hypoglycaemic agents, or insulin to achieve euglycemia can achieve near-normal maternal and neonatal outcome. Although, birth weight and neonatal hypoglycaemia remain higher in GDM patients as compare to controls.

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