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Original Research Article

A Research to Assess in Low Socioeconomic Status Population Outcomes of Maternal and Perinatal in Pregnant Women with Gestational Diabetes in Tertiary Care Hospital

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Abstract

Aim: The aim of the study was to determine the maternal and perinatal outcome in GDM among Low Socioeconomic Status.

Methods: This prospective observational study was carried out in the Department of Obstetrics and Gynecology, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India from July 2019 to June 2020. Total 220 patients were included into the study. Out of 110 GDM patients who were managed and delivered and another 110 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 hypoglycemic agents were given if required. Maternal and perinatal outcome was noted in all women.

Results: The prevalence of GDM was 4.23% (110/2600) total of 89(80.91%) were controlled on diet, whereas 12(10.91%) required insulin and 9(8.18%) were treated with oral hypoglycemic agent. Family history of diabetes was observed in a significantly higher number of GDM patients 31(28.18%) as compared to control group 17(15.45%) (P = 0.001). Gestational hypertension and preeclampsia were seen in a significantly higher number of 22(20%) cases in GDM patients as compared to controls 9(8.18%), whereas polyhydramnios was also seen in higher number in GDM it was 3(2.73%) and Prevalence of other antenatal complications such as UTI 14(12.73%) and candidiasis 6(3.64%) was higher in GDM patients as compared to non GDM patients groups. There was no significant difference in the mode of delivery between the two groups. Mean birth weight was significantly higher in GDM group 2887.61±542.57 as compared to control group 2763.59±646.12. There was no significant difference in Apgar score at 1 and 5 min in two groups. There was a significantly higher number of large-for- date babies in GDM group as compared to control group.

Conclusion: The prevalence of GDM was 4.23% in this study. Adequate treatment of GDM on diet, oral hypoglycemic 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

Socioeconomic status (SES) is a measure of an individual's position within a hierarchical social structure. The three most common indicators of SES are household income, education and occupation. Other measures include neighbourhood income, family structure, race/ethnicity and the accumulation of assets or wealth.[1] Socioeconomic status is a consistent and reliable predictor of health disparities, as socioeconomically disadvantaged groups tend to have poorer physical and mental health than their high-SES counterparts. Low-SES individuals also experience greater exposure to stress, and are more likely to engage in risk-taking behaviours such as smoking and alcohol/drug abuse.[2] 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 study was to determine the maternal and perinatal outcome in GDM among Low Socioeconomic Status.

Material and methods

This prospective observational study was carried out in the Department of Obstetrics and Gynecology, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India from July 2019 to June 2020. after taking the approval of the protocol review committee and institutional ethics committee.

Methodology

Total 220 patients were included into the study. Out of 110 GDM patients who were managed and delivered and another 110 women with normal profile patients without GDM who delivered during the same time were taken as controls. 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 was labeled 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 hypoglycemic 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.

Results

The prevalence of GDM was 4.23% (110/2600) total of 89(80.91%) were controlled on diet, whereas 12 (10.91%) required insulin and 9 (8.18%) were treated with oral hypoglycemic agent. Baseline characteristic of diabetic women and control is shown in table 1. There was no significant difference in age, BMI, and religion in both groups. However, there was a significant difference in socioeconomic status with a significantly higher number of women in lower socioeconomic class in GDM 72(65.45%) as compared to control 59(53.64%) (P = 0.001). Family history of diabetes was observed in a significantly higher number of GDM patients 31(28.18%) as compared to control group 17(15.45%) (P = 0.001). Various maternal complications of two groups are shown in table 3. Gestational hypertension and preeclampsia (pregnancy-induced hypertension) were seen in a significantly higher number of 22(20%) cases in GDM patients as compared to controls 9(8.18%), whereas polyhydramnios was also seen in higher number in GDM it was 3(2.73%) and Prevalence of other antenatal complications such as UTI 14(12.73%) and candidiasis 6(3.64%) was higher in GDM patients as compared to non GDM patients groups. Obstetric outcome in two groups is shown in table 4. Preterm delivery rate was higher in GDM patients 8(7.27%) as compared to control group 5(4.55%). There was no significant difference in the mode of delivery between the two groups. Postpartum haemorrhage and postpartum complication were also similar in two group. Perinatal outcome and neonatal complication in the two groups are shown in table 5. Mean birth weight was significantly higher in GDM group 2887.61±542.57 as compared to control group 2763.59±646.12. There was no significant difference in Apgar score at 1 and 5 min in two groups. There was a significantly higher number of large-for-date babies in GDM group as compared to control group.

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

Method of diagnosis	
	GDM(n=110)%
Fasting blood sugar 1h 2h	82(74.55%) 45 (40.91%) 38(34.55%)
Modes of treatment for gestational diabetes mellitus	
Diet	89(80.91%)
Insulin	12(10.91%)
Oral hypoglycemic agents	9(8.18%)

Table 2: Baseline characteristics of patients and control

	GDM (110)	**NON GDM (110)**	**P**
BMI(kg/m^2±SD)	24.69±4.7	24.87±4.59	0.72
Age			
Below 20 years	10(9.10%)	13(11.82%)	0.92
20-30 years	67(60.90%)	78(70.90%)	
30-40 years	20(18.18%)	16(14.55%)	
Above 40 years	13(11.82%)	3(2.73%)	

Socioeconomic status			
Lower	72(65.45%)	59(53.64%)	0.001
Middle	31(28.18%)	27(24.55%)	
Upper	7(6.36%)	24(21.82%)	
History of diabetes in family	31(28.18%)	17(15.45%)	0.001

Table 3: Maternal Complications in GDM and Non GDM Patients

Complication	**GDM(110)**	**NON GDM(110)**	**P**
UTI	14(12.73%)	10(9.10%)	0.39
Gestational hypertension/preeclampsia	22(20%)	9(8.18%)	0.014
Polyhydramnios	3(2.73%)	0	0.21
Vaginal candidiasis	6(3.64%)	3(2.73%)	0.23

Table 4: Outcomes in Both Groups

	GDM(n=110)%	**NONGDM (N=110) %**	**P (T- TEST)**
Preterm delivery	8(7.27%)	5(4.55%)	0.005
Modes of delivery			
Vaginal	73(66.36%)	46(41.82%)	0.32
Caesarean	37(33.64%)	64(58.18%)	
Instrumental	4(3.64%)	6(5.45%)	0.21
Primary postpartum haemorrhage	3(2.73%)	2(1.82%)	0.55
Postpartum sepsis	4(3.64%)	2(1.82%)	0.51

Table 5: Perinatal Outcomes in Both Groups

	GDM (200)	**NON GDM(200)**	**P-value**
Baby weight	2887.61±542.57	2763.59±646.12	0.03
Apgar 1 min	8.21±1.32	8.11±0.92	0.78
Apgar 5 min	8.63±1.44	8.74±0.78	0.32
Distribution of baby weight with reference to standard weight (%)			
AFD	80(72.73)	87(79.09%)	0.003
LFD	25(22.73%)	20(18.18%)	0.003
SFD	5(4.55)	3(2.73%)	
Hypoglycemia (%)	26(23.64%)	9(8.18%)	0.001
Hyperbilirubinemia (%)	5(4.55%)	4(3.64%)	0.59
Respiratory distress syndrome (%)	6(5.45%)	3(2.73%)	0.062
Congenital anomaly (%)	5(4.55 %)	4(3.64%)	0.063

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, cesarean delivery rate, and neonatal hypoglycemia 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 hyperglycemia 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 4.23% 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 semi urban, and 9.9% in rural area of Tamil Nadu. In the present study, there was a significant difference in socioeconomic status with a significantly higher number of women in lower socioeconomic class in GDM 72(65.45%) as compared to control 59(53.64%) (P = 0.001), but Rajput et al. observed higher prevalence in low socioeconomic class.[13] Family history of diabetes was observed in a significantly higher number of GDM patients 31(28.18%) as compared to control group 17(15.45%) (P = 0.001). Similar results were obtained by Nair et al.[12] In the present study, Gestational hypertension and preeclampsia (pregnancy-induced hypertension) were seen in a significantly higher number of 22(20%) cases in GDM patients as compared to controls 9(8.18%). 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 in GDM group 2887.61±542.57 as compared to control group 2763.59±646.12(P=0.03). Similarly, large-for-date babies were significantly higher in GDM patients than control (25(22.73%) vs. 20(18.18%), P = 0.003). There was significantly higher incidence of neonatal hypoglycemia in GDM patients than control (26(23.64%) vs. 9(8.18%), 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 center 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 12(10.91%) 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 hypoglycemia 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 hypoglycemic 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 hypoglycemic agents, or insulin to achieve euglycemia can achieve near-normal maternal and neonatal outcome. Although birth weight and neonatal hypoglycemia remain higher in GDM patients.

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