Section: OBG

Original Research Article

COMPARISON OF GESTATIONAL DIABETES AND INTRA UTERINE FETAL COMPLICATION IN A TERTIARY HEALTH FACILITY

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ABSTRACT

Among the many pregnancy-related medical conditions, gestational diabetes mellitus (GDM) stands out. The well-documented maternal and fetal complications that can occur as a result of untreated GDM are preventable with prompt dietary changes, insulin, and fetal monitoring. Over the course of a year, researchers in Tertiary Health Facility carried out this observational study. The screening and diagnostic procedure for GDM was a one-step test that involved the administration of 75 gms of oral glucose. All of the participants had their fetal and maternal outcomes examined. There was an 11% prevalence of GDM. Major risk factors for developing gestational diabetes mellitus were being 25 years old or older, being overweight, having multiple diabetes, and having a family history of the disease. Compared to the control group, the GDM group had worse maternal and fetal outcomes. Polyhydramnios and recurrent vaginal infections were common maternal problems in the GDM group. Among the GDM group, the rate of caesarean section was increased. There was an increased risk of metabolic problems and macrosomia in babies born to mothers with GDM.

Keywords: Gestational diabetes; Fetal monitoring; Fetal deaths; Maternal deaths; Anhydrous glucose; Polyhydramnios.

INTRODUCTION

Gestational diabetes mellitus (GDM) is a prevalent medical problem in pregnancy, affecting over 14% of pregnancies worldwide. It is characterized by glucose intolerance that begins or is first detected during pregnancy and is dangerous for both the mother and the unborn child.[1-3]Intrauterine fetal death (IUFD) is one of the most serious consequences of GDM, which persists despite improvements in obstetric care and diabetes treatment.[1]

The complex etiology of GDM involves hormonal shifts that cause insulin resistance during pregnancy. Hormones such as progesterone, cortisol, and human placental lactogen are secreted during the second and third trimesters of pregnancy, which hinder insulin's effectiveness. Maternal hyperglycemia causes the pancreas to produce more insulin, leading to fetal hyperinsulinemia and related problems like macrosomia, respiratory distress, and metabolic abnormalities.[4,5]Fetuses exposed to these substances during pregnancy are more likely to have metabolic syndrome, obesity, and type 2 diabetes as adults.[1,3,5]

Stillbirth, or intrauterine fetal death, is a major problem in maternal and child health worldwide.[2] In industrialized nations, between three and five out of every thousand pregnancies result in Intra-uterine fetal (IUF) complications. Factors such as placental insufficiency, fetal growth restriction, infections, and problems in the mother, such as pre-eclampsia and gestational diabetes mellitus, can lead to IUFD.[4]

The precise pathways through which GDM causes IUFD have recently become the subject of increased research effort. Inflammation of the placenta, oxidative stress, and endothelial dysfunction are consequences of GDM that may affect the perfusion of the placenta and exacerbate fetal discomfort.[6,7] Fetal hyperinsulinemia is a direct result of hyperglycemia in the mother and can cause macrosomia, or excessive fetal growth.[8] Shoulder dystocia, which raises the risk of hypoxia and

eventual IUFD, is more common in larger newborns after delivery.[2]

IUFD is still a concern in GDM-complicated pregnancies, especially in cases where glycemic control is not ideal. Prompt diagnosis and good management of GDM can reduce the risk of IUFD.[6,7] Care for pregnancies impacted by GDM must also include prompt delivery and close fetal monitoring, particularly during the third trimester when the risk of IUFD is greatest.[5,7,8] Hence, the aim of the present study was to determine the GDM and IUF complication in a tertiary health facility.

MATERIAL AND METHODS

The Department of Obstetrics and Gynecology at Tertiary Health Facility conducted the current study. The study included a sample size of 300 pregnant women with a gestational age of less than 16 weeks who were randomly selected during a standard antenatal check-up at an antenatal clinic. The study enlisted a cohort of female participants between Tertiary Health Facility. We administered a 75-gm solution of anhydrous glucose powder, dissolved in water, to the chosen female participants over a period of 5 minutes, irrespective of their last meal timing. We obtained a venous blood sample at the 2-hour mark to quantitatively assess plasma glucose levels using the glucose oxidase peroxidase (GOD-POD) technique. We instructed the participants to refrain from physical activity and smoking for 2 hours after consuming glucose. When the 2-hour plasma glucose level exceeds 140 mg/dl, we establish the diagnosis of gestational diabetes mellitus. We diagnosed the individual with overt diabetes when the glucose level exceeded 200 mg/dl. We conducted a second glucose test at about 24 to 28 weeks of gestation in women who exhibited normal glucose levels during their initial antenatal visit. In accordance with hospital practice, women who tested positive had treatment for blood sugar management, specifically medical nutritional therapy (MNT), for a duration of two weeks. When MNT failed to achieve control, we initiated insulin administration. Until delivery, we monitored the participants. The study examined the fate of the fetus and mother. The study excluded pregnant women diagnosed with chronic renal disease, pancreatic disease, thyroid disorder, or other endocrine disorders; confirmed cases of diabetes mellitus; patients taking medications that affect glucose metabolism, such as progesterone, corticosteroids, psychoactive agents, and catecholamines; and women with substance abuse issues, such as opioids, cocaine, marijuana, and benzodiazepines.

Statistical Analysis

We conducted the statistical analysis using SPSS software. We used a two-tailed test to examine the correlation between various study variables. In this context, the study groups were examined. We employed the Z-test to assess the statistical significance of the difference between two proportions of the groups. We employed a t-test to compare the means. We computed the odds ratio (OR) with a 95% confidence interval (CI) to evaluate the various risk factors. We established the significance level at 0.05 and specified the confidence intervals at a 95 percent level. A p-value less than 0.05 was deemed to be statistically significant.

RESULTS

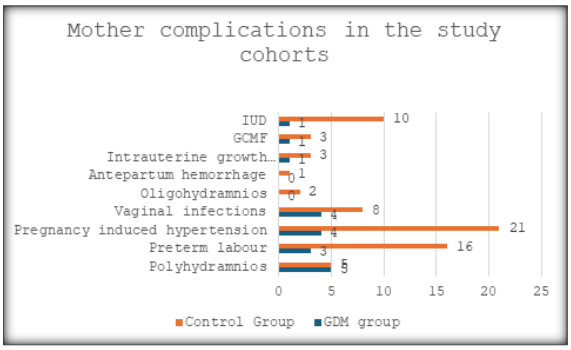

Figure 1: Mother complications in the study cohorts

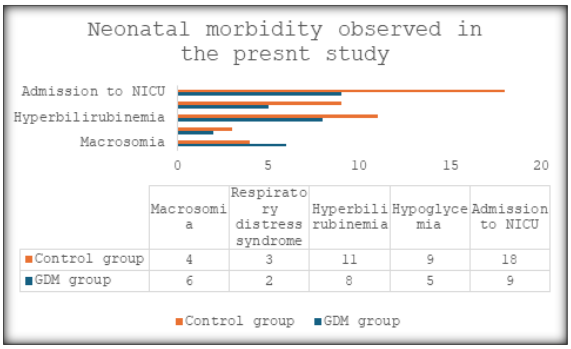

Figure 2: Neonatal Morbidity observed in the present study

The study diagnosed 33 (11%) of the 300 expectant women with gestational diabetes, categorizing them as part of the GDM group. We categorized the remaining 267 (89%) women as part of the control group. In the 300-subject research population, 177 (59%) of the women were under the age of 25, while the remaining 123 (41%) were in the risk factor group (age ≥ 25). Age (<25/≥25 years), residence (urban/rural), and body weight (obese/non-obese) were all significantly different in the study population. The research population was homogeneous in terms of gravidity (primigravida/multigravida), as the difference was not statistically significant. In the control group, the majority of women, 215 (81%), delivered vaginally, while 52 (19%) women underwent a cesarean section. In the case of GDM, 19 (59%) women delivered vaginally, while 12 (41%) women delivered by cesarean section. The Caesarean section rate was significantly higher in cases of GDM when compared with controls. 17 (53%) of

the total GDM cases effectively managed their blood sugar through diet alone, while the remaining 16 (47%) required insulin therapy. Despite receiving insulin therapy, one patient experienced blood sugar fluctuations until delivery. We examined the feto-maternal outcome in 24 cases and 267 controls. During the current pregnancy, females diagnosed with GDM faced an overall adverse outcome, along with a significantly higher incidence of polyhydramnios and recurrent vaginal infections. Babies born to GDM-positive mothers showed a higher incidence of macrosomia and lower APGAR scores at one minute, leading to a poor neonatal outcome.

The fetal outcome was significantly inferior in the GDM-positive mothers when compared to the other two categories. It is not surprising that the GDM group had a higher incidence of macrosomia. Mothers with gestational diabetes mellitus also showed metabolic abnormalities, including hypoglycemia and hyperbilirubinemia. The proportion of GDM-positive females admitted to the NICU was also higher due to the newborn's numerous complications.

DISCUSSION

33 (11%) of the 300 pregnant females examined received a GDM diagnosis. The incidence of GDM varies across different target populations. Swaminathan et al,[10] conducted a study screening pregnant woman, which revealed an overall prevalence rate significantly higher than our findings.[11]A study,[12] found that the prevalence of GDM among rural mothers was 3.8%. The current investigation revealed a GDM prevalence rate of 11%. This study's prevalence aligns with the findings of a previous study.[13] The average age of patients with GDM was 29 ± 4.25 years. The community setting study revealed that the age group of 30 to 34 years exhibited the highest prevalence.[14] A study revealed a consistent rise in GDM prevalence with age, from 25% in women under 25 to 18% in those 35 years or older.[15] The present investigation aligns with the conclusions reported by the authors. The present study found that the average BMI of the control group was 25.28 ± 3.32 kg/m2, with a range of 20 to 31 kg/m2. Similarly, the patients' average BMI was 27.18 ± 4.56 kg/m2, with a range of 20.4% to 32.0 kg/m2. A total of nine cases exhibited obesity, in contrast to a mere ten instances within the control population. Multiple studies have provided evidence supporting the notion that both obese and overweight women are significantly more susceptible to the development of gestational diabetes.[5-8]Because carbohydrate intolerance is more common in the latter half of pregnancy, this timeframe is typically used to detect a significant proportion of cases. Six women in this study received a diagnosis of GDM during their initial visit, which took place within 16 weeks of gestation. Furthermore, the second visit, which took place between 24 and 28 weeks of gestation, led to the diagnosis of 25 women. According to a study,[14]13.4% of women received a GDM diagnosis at 16 weeks of gestation, 23% between 17 and 23 weeks, and the remaining 64.6% after more than 24 weeks.

Among a sample of 300 women, 189 mothers gave birth at our institution. As anticipated, the current study revealed that women diagnosed with GDM exhibited a greater incidence of obstetric complications. These complications included polyhydroamnios, recurrent vaginal infections, intrauterine growth retardation, intrauterine death, pre-term labor, preeclampsia, and gestational cell membrane fluid. Previous research conducted has yielded comparable results,[16,17] Within our study, 12 females with GDM underwent a caesarian section, while 12 in the control group required this procedure. Numerous studies have reported elevated incidence of caesarian deliveries among patients with GDM, even when maternal blood glucose control throughout pregnancy is satisfactory,[18, 19]

During conception or embryogenesis, hyperglycemia in the mother usually leads to birth defects. Conversely, during pregnancy, glucose intolerance results in larger-than-average babies, metabolic issues, fetal death, and the need for admission to the Neonatal Intensive Care Unit (NICU). A study of GDM patients observed a macrosomia rate of 28.7%.[20]The current investigation found that 6 GDM patients experienced macrosomia, compared to 4 cases in the control group. Neonatal hypoglycemia, polycythemia, hypocalcemia, and hyperbilirubinemia are metabolic problems that might potentially arise in infants with GDM. Our investigation revealed a higher incidence of these problems in infants with GDM compared to the control group. 5 of infants born with GDM had hypoglycemia, 8 had hyperbilirubinemia, and 2 experienced respiratory distress syndromes. A study in Iran revealed that the prevalence of respiratory distress syndrome, hypoglycemia, and large for gestational age babies among individuals with GDM was 3.7%, 18.5%, and 14.8%, respectively.[21] GDM's significance lies in its ability to contribute to the future development of diabetes for both generations. This demographic represents an optimal target for lifestyle modification or pharmacologic intervention aimed at delaying or postponing the emergence of openly diagnosed diabetes. GDM is a frequently seen medical condition during pregnancy that necessitates prompt diagnosis, proper management, and close monitoring to prevent complications for both the mother and the fetus.

CONCLUSION

This study highlights the significant association between GDM and IUF complications in a tertiary

health facility. Poor glycemic control, advanced maternal age, and coexisting maternal conditions such as obesity were identified as major contributors to adverse outcomes. Effective management, including early detection, tight glycemic control, and timely intervention, is essential to reduce the risk of IUF complications in GDM-complicated pregnancies. These findings underscore the importance of tailored prenatal care in tertiary settings to prevent IUF complications and improve maternal and fetal outcomes in high-risk pregnancies.

Conflict of interest: There is no conflict of interest among the present study authors.

REFERENCES

1. Gökçen İşcan R, Malvasi A. Intrauterine Fetal Death: Management and Complications. InPractical Guide to Simulation in Delivery Room Emergencies 2023 Jun 14 (pp. 219-243). Cham: Springer International Publishing.
2. Luo R, Wen W, Corsi DJ, Fell DB, Taljaard M, Wen SW, Walker MC. Comparison of adverse maternal and perinatal outcomes between induction and expectant management among women with gestational diabetes mellitus at term pregnancy: a systematic review and meta-analysis. BMC Pregnancy and Childbirth. 2023 Jul 12;23(1):509.
3. Quotah OF, Andreeva D, Nowak KG, Dalrymple KV, Almubarak A, Patel A, Vyas N, Cakir GS, Heslehurst N, Bell Z, Poston L. Interventions in preconception and pregnant women at risk of gestational diabetes; a systematic review and meta-analysis of randomised controlled trials. Diabetology & Metabolic Syndrome. 2024 Jan 4;16(1):8.
4. Wahabi HA, Fayed A, Esmaeil S, Elmorshedy H, Titi MA, Amer YS, Alzeidan RA, Alodhayani AA, Saeed E, Bahkali KH, Kahili-Heede MK. Systematic review and meta-analysis of the effectiveness of pre-pregnancy care for women with diabetes for improving maternal and perinatal outcomes. PloS one. 2020 Aug 18;15(8):e0237571.
5. Preda A, Iliescu DG, Comănescu A, Zorilă GL, Vladu IM, Forțofoiu MC, Țenea-Cojan TS, Preda SD, Diaconu ID, Moța E, Gheorghe IO. Gestational diabetes and preterm birth: what do we know? Our experience and mini-review of the literature. Journal of Clinical Medicine. 2023 Jul 9;12(14):4572.
6. Yoles I, Sheiner E, Wainstock T. First pregnancy risk factors and future gestational diabetes mellitus. Archives of Gynecology and Obstetrics. 2021 Oct; 304:929-34.
7. Noor N, Parveen S, Madan I, Hoda A. Analytical Study of Intrauterine Fetal Death and Associated Maternal Conditions at a Tertiary Centre. Parity. 2020;1(G2):G3.
8. Deshpande RS, Manvi MR. The study of causes, mode of delivery in intrauterine fetal death and associated complications. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2020 Nov 26;9(12):5030.
9. Patel S, Thaker R, Shah P, Majumder S. Study of causes and complications of intra uterine fetal death (IUFD). International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2014 Dec 1;3(4):931-6.
10. Swaminathan G, Swaminathan A, Corsi DJ. Prevalence of gestational diabetes in India by individual socioeconomic, demographic, and clinical factors. JAMA network open. 2020 Nov 2;3(11):e2025074-.
11. Sunita TH, Desai RM, Neravi A. Gestational diabetes mellitus diagnosed with single test glucose screening test and its outcome in a tertiary hospital in South India. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2015 Nov 1;4(6):1979-84.
12. Chebrolu P, Kurbude R, Thakur M, Shah N, Jain R. Gestational diabetes in rural central India: low prevalence but absence of typical risk factors. Heliyon. 2021 Jul 1;7(7).
13. Balaji B, Ram U, Mohan V. Screening, diagnosis and management of gestational diabetes mellitus. Journal of the Indian Institute of Science. 2023 Jan;103(1):371-9.
14. Seshiah V, Balaji V, Balaji MS, Paneerselvam A, Arthi T, Thamizharasi M, Datta M. Prevalence of gestational diabetes mellitus in South India (Tamil Nadu): a community based study. JAPI. 2008 May; 56:329-3.
15. Bhatt AA, Dhore PB, Purandare VB, Sayyad MG, Mandal MK, Unnikrishnan AG. Gestational diabetes mellitus in rural population of Western India–Results of a community survey. Indian journal of endocrinology and metabolism. 2015 Jul 1;19(4):507-10.
16. Gasim T. Gestational diabetes mellitus: maternal and perinatal outcomes in 220 Saudi women. Oman medical journal. 2012 Mar;27(2):140.
17. Odar E, Wandabwa J, Kiondo P. Maternal and fetal outcome of gestational diabetes mellitus in Mulago Hospital, Uganda. African Health Sciences. 2004 Nov 10;4(1):9-14.
18. Ovesen PG, Jensen DM, Damm P, Rasmussen S, Kesmodel US. Maternal and neonatal outcomes in pregnancies complicated by gestational diabetes. A nation-wide study. The Journal of Maternal-Fetal & Neonatal Medicine. 2015 Sep 22;28(14):1720-4.
19. Billionnet C, Mitanchez D, Weill A, Nizard J, Alla F, Hartemann A, Jacqueminet S. Gestational diabetes and adverse perinatal outcomes from 716,152 births in France in 2012. Diabetologia. 2017 Apr; 60:636-44.
20. Khan R, Ali K, Khan Z. Maternal and fetal outcome of gestational diabetes mellitus. Gomal Journal of Medical Sciences. 2013 Jul 2;11(1).
21. Hamedi FA. Comparison of maternal and fetal/neonatal complications in gestational and pre-gestational diabetes mellitus. Acta Medica Iranica. 2005:263-7.