Original Article

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Pregnancy Outcomes in Women with Diet-Controlled versus Insulin-Treated GDM

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ABSTRACT

Introduction*: Gestational diabetes mellitus (GDM) is one of the most frequent metabolic pregnancy disorders, involving the body's failure to regulate glucose levels adequately for the first time during pregnancy. If left untreated, it can lead to serious health problems for both the mother and the baby. This study aims to examine the differences in pregnancy results between women whose gestational diabetes was controlled by diet and those who required insulin treatment.* ***Methods & Materials****: This comparative observational study was conducted in the Department of Obstetrics and Gynecology, 250 Bedded General Hospital, Manikganj, Bangladesh, from January to December 2025. A total of 150 pregnant women with GDM were enrolled and categorized into diet-controlled GDM and insulin-treated GDM groups. Data were analyzed using SPSS version 26.0.* ***Result****: Out of 150 women diagnosed with GDM, 63.3% managed their glucose levels by diet, whereas 36.7% needed insulin treatment. Compared to the diet-controlled group, those on insulin were older, had a higher BMI, were diagnosed earlier, and had more deteriorated blood sugar levels. Besides, they displayed greatly elevated maternal problems such as preeclampsia (21.8% vs. 9.5%), preterm births (25.5% vs. 11.6%), and cesarean operations (54.5% vs. 33.7%). Newborn health was adversely affected in the insulin recipients as shown by greater birth size (3.36 vs. 3.02 kg), macrosomic infants (21.8% vs. 8.4%), newborn hypoglycemia (25.5% vs. 6.3%), NICU admissions (32.7% vs. 12.6%), and respiratory distress (23.6% vs. 7.4%).* ***Conclusion****: Women with insulin-treated GDM face substantially increased rates of negative maternal and neonatal outcomes in comparison to those who were managed with diet only. The insulin-treated women were generally older, had a higher BMI, were diagnosed earlier, and had less well-controlled blood sugar, all signs of more severe metabolic impairment.*

Keywords*: Gestational diabetes mellitus, Insulin, Diet, Macrosomia*

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INTRODUCTION

Gestational diabetes mellitus (GDM) is among the most frequent metabolic conditions in pregnancy, marked by glucose intolerance which is first recognised during pregnancy. Owing to the worldwide surge in GDM, particularly the swift rise of GDM in the low- and middle-income countries like those of South Asia, it is now a great public health challenge. The rising rates of obesity, inactive lifestyles, and mother's higher age at childbirth have largely driven the global increase in the incidence of GDM [1,2]. Besides short-term effects, GDM also leads to long-term complications for the mother and child, such as preeclampsia, more frequent cesarean section, large baby, low blood sugar in the newborn, and higher risk of developing type 2 diabetes in the future [3,4]. At the heart of GDM treatment is keeping blood sugar levels in the target range. When sugar is controlled well, fewer problems happen to the mother and baby [5]. At first, women are told how to change their life, mainly what they eat and how they move. But if a person gets their normal blood sugar just by diet, then drugs-particularly insulin-are needed. Some 20 to 40 percent of GDM women in studies depending on the group and the cutoff for diagnosis still need insulin to be at goal [6]. Usually, diet-controlled GDM is thought to be a less severe version of the disease, while insulin-requiring GDM is a case of a more severe metabolic dysfunction, such as heightened insulin resistance and decreased -cell function. Research indicates that women in need of insulin generally exhibit higher initial glucose levels, are diagnosed earlier in their pregnancy, and are more likely to be obese and have a history of GDM than those who are managed by diet only [7]. Differences in baseline characteristics could to some extent influence pregnancy outcomes and therefore complicate the direct comparison of two groups. Several published studies have investigated maternal and neonatal outcomes in lifestyle-controlled versus insulin-treated GDM. Some of the revealings suggest that insulin-treated women are more likely to experience adverse outcomes, such as delivering large-for-gestational age (LGA) infants and undergoing cesarean sections [8]. To illustrate, a retrospective analysis found considerably higher LGA (28.5% vs. 13.1%) and cesarean section (44.1% vs. 27.0%) rates in the insulin-treated women compared to those receiving only diet control [7]. Also, the use of insulin has been connected with a heightened risk of neonatal hypoglycemia, with one investigation showing a more than fourfold increased risk in the insulin group [8]. On the other hand, several research works reported no differences in the main perinatal outcomes between the diet-controlled and the insulin-treated groups provided that glycemic control was properly maintained. Koning et al. showed that perinatal complications such as macrosomia,

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preterm delivery, and neonatal intensive care unit (NICU) admission were at the same level in the two methods of treatment [9]. Hence, this study investigates the differences in pregnancy outcomes in women with diet-controlled versus insulin-treated gestational diabetes mellitus.

METHODS & MATERIALS

This comparative observational study was conducted at the Department of Obstetrics and Gynecology of 250 Bedded General Hospital, Manikganj, Bangladesh, from January 2025 to December 2025. 150 pregnant women diagnosed with gestational diabetes mellitus (GDM) through the standard oral glucose tolerance test (OGTT) were enrolled. Participants were divided into two groups based on the treatment method: diet-controlled GDM (Group A) and insulin-treated GDM (Group B), according to the glycemic response to the initial lifestyle modification. Women with pre-existing diabetes, those expecting multiple babies, or those having major health problems were not part of the study. A structured data collection form was used to document sociodemographic details, obstetric history, and clinical parameters. Pre-eclampsia, mode of delivery, preterm labor are some maternal outcomes and birth weight macrosomia hypoglycemia, respiratory distress, NICU admission are some neonatal outcomes. In addition, fasting glucose, postprandial glucose, and HbA1c levels were measured as indicators of glycemic control. Data were analyzed using statistical software SPSS version 26.0. Continuous variables were expressed as mean +/- standard deviation while categorical variables were summarized by their frequencies and percentages. The chi-square test was performed to examine the differences between the groups and a p-value less than 0.05 was considered statistically significant.

RESULTS

The mean age of women in the insulin-treated group (30.6 ± 4.8 years) was significantly higher than that of the diet-controlled group (27.8 ± 4.2 years) (p = 0.001). Similarly, body mass index (BMI) was significantly higher among insulin-treated women (28.4 ± 3.9 kg/m^2) compared to those managed with diet alone (25.1 ± 3.2 kg/m^2) (p < 0.001). Although a higher proportion of insulin-treated women resided in urban areas (65.5% vs. 54.7%), this difference was not statistically significant (p = 0.18). A significantly greater proportion of women in the insulin-treated group had a positive family history of diabetes mellitus (49.1% vs. 29.5%, p = 0.01) *Table I*.

Table I: Sociodemographic Characteristics of the Study Population (*n* = 150)

Variables	Diet-Controlled (n = 95)	Insulin-Treated (n = 55)	p-value
Age (years), mean ± SD	27.8 ± 4.2	30.6 ± 4.8	0.001
BMI (kg/m^2), mean ± SD	25.1 ± 3.2	28.4 ± 3.9	<0.001
Urban residence n (%)	52 (54.7)	36 (65.5)	0.18
Family history of DM n (%)	28 (29.5)	27 (49.1)	0.01

Primigravida status was more common in the diet-controlled group (44.2%) compared to the insulin-treated group (32.7%), although this difference did not reach statistical significance (p = 0.15). In contrast, a history of previous GDM was significantly higher among insulin-treated women (25.5%) compared to those managed with diet alone (10.5%) (p = 0.01). In addition, the time of confirmation (gestational maintenance) of the insulin - treated group is quite earlier (25.6±3.1 weeks) than the diet-controlled group (28.9 2.5 weeks) (p < 0.001) *Table II*.

Table II: Obstetric Characteristics (*n* = 150)

Variables	Diet-Controlled (n = 95)	Insulin-Treated (n = 55)	p-value
Primigravida n (%)	42 (44.2)	18 (32.7)	0.15
Previous GDM n (%)	10 (10.5)	14 (25.5)	0.01
Gestational age at diagnosis (weeks)	28.9 ± 2.5	25.6 ± 3.1	<0.001

Moreover, preeclampsia is more than twice as common in women who needed insulin therapy (21.8%) as opposed to those who had a diet-based treatment alone (9.5%) (p = 0.03). Similarly, preterm delivery occurred more frequently in the insulin-treated group (25.5%) than in the diet-controlled group (11.6%) (p = 0.02), The rate of cesarean section was also significantly elevated among insulin-treated women (54.5% vs. 33.7%, p = 0.01) *Table III*.

Table III: Maternal Outcomes (*n* = 150)

Outcomes	Diet-Controlled (n = 95)	Insulin-Treated (n = 55)	p-value
Preeclampsia n (%)	9 (9.5)	12 (21.8)	0.03
Preterm delivery n (%)	11 (11.6)	14 (25.5)	0.02
Cesarean section n (%)	32 (33.7)	30 (54.5)	0.01

The mean birth weight was significantly higher in the insulin-treated group (3.36 ± 0.51 kg) compared to the diet-controlled group (3.02 ± 0.42 kg) (p < 0.001). Correspondingly, the incidence of macrosomia was significantly greater in the insulin-treated group (21.8%) than in the diet-controlled group (8.4%) (p = 0.01). However, the incidence of low birth weight was similar in both groups (10.9% vs. 10.5%, p = 0.94) *Table IV*.

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Table IV: Neonatal Outcomes (*n* = 150)

Outcomes	Diet-Controlled (n = 95)	Insulin-Treated (n = 55)	p-value
Birth weight (kg), mean ± SD	3.02 ± 0.42	3.36 ± 0.51	<0.001
Macrosomia (>4 kg) n (%)	8 (8.4)	12 (21.8)	0.01
Low birth weight (<2.5 kg) n (%)	10 (10.5)	6 (10.9)	0.94

The occurrence of neonatal hypoglycemia was significantly elevated in the insulin group (25.5%) compared to the diet-controlled group (6.3%) (p = 0.001). Likewise, NICU admissions were significantly increased in the insulin-treated group (32.7% vs. 12.6%, p = 0.002), indicating a rise in neonatal complications. Respiratory distress was another factor that was notably higher amongst infants of insulin-treated mothers (23.6% vs. 7.4%, p = 0.004) *Table V*.

Table V: Neonatal Complications (*n* = 150)

Complications	Diet-Controlled (n = 95)	Insulin-Treated (n = 55)	p-value
Neonatal hypoglycemia n (%)	6 (6.3)	14 (25.5)	0.001
NICU admission n (%)	12 (12.6)	18 (32.7)	0.002
Respiratory distress n (%)	7 (7.4)	13 (23.6)	0.004

Mean fasting blood glucose levels were significantly higher among insulin-treated women (104.6 ± 10.5 mg/dL) compared to the diet-controlled group (91.4 ± 8.2 mg/dL) (p < 0.001). Similarly, postprandial glucose levels were markedly elevated in the insulin group (148.2 ± 15.3 mg/dL vs. 124.8 ± 12.1 mg/dL, p < 0.001). Glycated hemoglobin (HbA1c), reflecting long-term glycemic status, was also significantly higher in the insulin-treated group (6.5 ± 0.6%) compared to the diet-controlled group (5.8 ± 0.4%) (p < 0.001) *Table VI*.

Table VI: Glycemic Control Parameters (*n* = 150)

Parameters	Diet-Controlled (n = 95)	Insulin-Treated (n = 55)	p-value
Fasting glucose (mg/dL)	91.4 ± 8.2	104.6 ± 10.5	<0.001
Postprandial glucose (mg/dL)	124.8 ± 12.1	148.2 ± 15.3	<0.001
HbA1c (%)	5.8 ± 0.4	6.5 ± 0.6	<0.001

DISCUSSION

In sociodemographic characteristics, our study found that insulin-treated women were older (30.6 ± 4.8 vs. 27.8 ± 4.2 years) and had higher BMI (28.4 ± 3.9 vs. 25.1 ± 3.2 kg/m^2), with more frequent family history of diabetes (49.1% vs. 29.5%). Similarly, Yogev et al. reported that women requiring insulin had higher BMI (30.2 ± 5.1 vs. 26.8 ± 4.3 kg/m^2) and were older (32.1 ± 5.2 vs. 29.4 ± 4.7 years), along with increased familial predisposition (51.0% vs. 34.0%) [10]. Regarding obstetric characteristics, our study showed earlier diagnosis in the insulin group (25.6 ± 3.1 vs. 28.9 ± 2.5 weeks) and higher prior GDM (25.5% vs. 10.5%). In agreement, a study by Cosson et al. found that insulin-treated women were diagnosed earlier (26.2 ± 5.8 vs. 29.1 ± 5.6 weeks) and had higher recurrence of GDM (27.8% vs. 14.6%) [11]. For maternal outcomes, this study observed higher preeclampsia (21.8% vs. 9.5%), preterm delivery (25.5% vs. 11.6%), and cesarean section (54.5% vs. 33.7%) in insulin-treated women. Mission et al. reported preeclampsia rates of 18.9% in insulin-treated versus 10.2% in diet-controlled women, and cesarean delivery rates of 49.6% vs. 34.8% [12]. Additionally, Melamed et al. found preterm delivery rates of 20.1% in insulin-treated versus 12.3% in diet-controlled groups [13]. In neonatal outcomes, our study demonstrated higher mean birth weight (3.36 ± 0.51 vs. 3.02 ± 0.42 kg) and macrosomia (21.8% vs. 8.4%) in the insulin group. Similarly, Wendland et al. reported macrosomia rates of 24.7% in insulin-treated versus 11.5% in diet-controlled GDM [14]. Furthermore, Egan et al. found mean birth weights of 3.48 ± 0.52 kg in insulin-treated versus 3.21 ± 0.47 kg in diet-controlled women [15]. Regarding neonatal complications, our study found higher neonatal hypoglycemia (25.5% vs. 6.3%), NICU admission (32.7% vs. 12.6%), and respiratory distress (23.6% vs. 7.4%) in insulin-treated cases. Similarly, Farrar et al. observed respiratory distress in 19.3% of insulin-treated neonates compared to 9.8% in diet-controlled pregnancies [16]. In terms of glycemic control, this study showed higher fasting glucose (104.6 ± 10.5 vs. 91.4 ± 8.2 mg/dL), postprandial glucose (148.2 ± 15.3 vs. 124.8 ± 12.1 mg/dL), and HbA1c (6.5 ± 0.6% vs. 5.8 ± 0.4%) in insulin-treated women. Cosson et al. similarly reported higher fasting glucose levels (5.4 ± 0.7 vs. 4.8 ± 0.6 mmol/L) and HbA1c (5.9% vs. 5.4%) in insulin-treated groups [11].

LIMITATIONS

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community

CONCLUSION

This study indicates that ladies with insulin-treated gestational diabetes are at a notably higher risk of experiencing adverse maternal and neonatal events compared to those who manage their condition through diet only. Women who used insulin were on average older, had a higher BMI, were given their diagnosis earlier, and had poorer glycemic control, thereby manifesting a more severe metabolic disorder. All these elements combined to increase the risk of preeclampsia, early delivery, cesarean section, a big baby, hypoglycemia in the newborn, respiratory distress, and neonatal intensive care unit admission.

RECOMMENDATION

Testing for gestational diabetes needs to be done early during pregnancy for all women but mainly for those who have risk factors such as being older in age, having a high BMI, and a family history of diabetes. Women who are found to have GDM should be closely followed up and managed with individualized plans that focus firstly on strict glycemic

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control by diet and lifestyle changes and insulin should be started without any delay if they cannot be controlled. Regular prenatal check-ups and fetal surveillance are the keys to recognizing and managing complications in their early stages.

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CONFLICT OF INTEREST
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REFERENCES

1. Aranaz P, Navarro-Herrera D, Zabala M, Miguéliz I, Romo-Hualde A, López-Yoldi M. American Diabetes Association 2010. Diagnosis and classification of diabetes mellitus. Diabetes Care, 33 (1): S62-69. Declaration of originality. 2023 Mar;33(1):189.
2. Guariguata L, Linnenkamp U, Beagley J, Whiting DR, Cho NH. Global estimates of the prevalence of hyperglycaemia in pregnancy. Diabetes research and clinical practice. 2014 Feb 1;103(2):176-85.
3. Farrar D, Simmonds M, Bryant M, Sheldon TA, Tuffnell D, Golder S, Dunne F, Lawlor DA. Hyperglycaemia and risk of adverse perinatal outcomes: systematic review and meta-analysis. bmj. 2016 Sep 13;354.
4. Zhu Y, Zhang C. Prevalence of gestational diabetes and risk of progression to type 2 diabetes: a global perspective. Current diabetes reports. 2016 Jan;16(1):7.
5. Brown J, Grzeskowiak L, Williamson K, Downie MR, Crowther CA. Insulin for the treatment of women with gestational diabetes. Cochrane Database of Systematic Reviews. 2017(11).
6. Koning SH, Hoogenberg K, Scheuneman KA, Baas MG, Korteweg FJ, Sollie KM, Schering BJ, van Loon AJ, Wolffenbuttel BH, van den Berg PP, Lutgers HL. Neonatal and obstetric outcomes in diet- and insulin-treated women with gestational diabetes mellitus: a retrospective study. BMC Endocrine Disorders. 2016 Sep 29;16(1):52.
7. Benhalima K, Robyns K, Van Crombrugge P, Deprez N, Seynhave B, Devlieger R, Verhaeghe J, Mathieu C, Nobels F. Differences in pregnancy outcomes and characteristics between insulin-and diet-treated women with gestational diabetes. BMC pregnancy and childbirth. 2015 Oct 23;15(1):271.
8. Sheng B, Ni J, Lv B, Jiang G, Lin X, Li H. Short-term neonatal outcomes in women with gestational diabetes treated using metformin versus insulin: a systematic review and meta-analysis of randomized controlled trials. Acta Diabetologica. 2023 May;60(5):595-608.
9. Goedegebure EA, Koning SH, Hoogenberg K, Korteweg FJ, Lutgers HL, Diekman MJ, Stekkinger E, van den Berg PP, Zwart JJ. Pregnancy outcomes in women with gestational diabetes mellitus diagnosed according to the WHO-2013 and WHO-1999 diagnostic criteria: a multicentre retrospective cohort study. BMC pregnancy and childbirth. 2018 May 10;18(1):152.
10. Yogev Y, Melamed N, Chen R, Nassie D, Pardo J, Hod M. Glyburide in gestational diabetes–prediction of treatment failure. The journal of maternal-fetal & neonatal medicine. 2011 Jun 1;24(6):842-6.
11. Cosson E, Carbillon L, Valensi P. High fasting plasma glucose during early pregnancy: a review about early gestational diabetes mellitus. Journal of diabetes research. 2017;2017(1):8921712.
12. Mission JF, Catov J, Deihl T, Feghali M, Scifres C. Antibiotic use in pregnancy, abnormal fetal growth, and development of gestational diabetes mellitus. American Journal of Perinatology. 2019 Feb;36(03):243-51.
13. Melamed N, Yogev Y, Glezerman M. Fetal gender and pregnancy outcome. The Journal of Maternal-Fetal & Neonatal Medicine. 2010 Apr 1;23(4):338-44.
14. Wendland EM, Torloni MR, Falavigna M, Trujillo J, Dode MA, Campos MA, Duncan BB, Schmidt MI. Gestational diabetes and pregnancy outcomes-a systematic review of the World Health Organization (WHO) and the International Association of Diabetes in Pregnancy Study Groups (IADPSG) diagnostic criteria. BMC pregnancy and childbirth. 2012 Mar 31;12(1):23.
15. Egan AM, Dunne FP. Optimal management of gestational diabetes. British medical bulletin. 2019 Sep 19;131(1):97-108.
16. Farrar D, Simmonds M, Bryant M, Sheldon TA, Tuffnell D, Golder S, Dunne F, Lawlor DA. Hyperglycaemia and risk of adverse perinatal outcomes: systematic review and meta-analysis. bmj. 2016 Sep 13;354.