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OBSTETRIC MANAGEMENT OUTCOMES OF PATIENTS WITH GESTATIONAL DIABETES MELLITUS DELIVERING AFTER 34 WEEKS AT NGHE AN OBSTETRICS AND PEDIATRICS HOSPITAL

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ABSTRACT

Objective: To evaluation of obstetric outcomes in patients with gestational diabetes mellitus who delivered after 34 weeks at Nghe An Obstetrics and Pediatrics Hospital.

Subjects and Methods: A cross-sectional descriptive study based on the medical records of 150 patients with gestational diabetes mellitus who delivered after 34 weeks at Nghe An Obstetrics and Pediatrics Hospital from January 1, 2022 to December 31, 2023.

Results: Most patients were older than 25 years, and 46% had a history of previous cesarean delivery. A total of 96.7% of gestational diabetes mellitus (GDM) cases were delivered by cesarean section, primarily due to a prior cesarean section (38.62%) and complications of GDM (macrosomia, abnormal fetal presentation or amniotic fluid abnormalities, etc.). The mean neonatal birth weight was 2770 g, and Apgar scores were favorable, ranging from 7 to 10 in more than 94% of cases. Respiratory distress and hypoglycemia were the two most common neonatal complications, accounting for 6% and 3.3%, respectively.

Conclusions: Cesarean delivery was the predominant mode of delivery among patients with gestational diabetes mellitus, accounting for 96.7% of cases. Most neonates had a birth weight around 2,500 g with favorable Apgar scores ranging from 7 to 10. The most common neonatal complications were respiratory distress and hypoglycemia.

Keywords: Gestational diabetes mellitus (GDM), obstetric outcomes of gestational diabetes mellitus, neonatal outcomes of gestational diabetes mellitus.

1. INTRODUCTION

Gestational diabetes mellitus (GDM) is one of the factors that increase the risk of antepartum, intrapartum, and postpartum complications for both the mother and fetus, including preeclampsia, miscarriage, stillbirth, and macrosomia leading to obstructed labor. According to a study by Yun Soo Chung in South Korea (2022), patients with GDM had a 2.68-fold higher likelihood of preterm birth before 34 weeks compared with non-GDM patients (95% CI 0.88–8.16; p = 0.083) [1]. In addition, numerous studies have shown that gestational diabetes mellitus, particularly in cases with poor glycemic control, may lead to macrosomia and polyhydramnios. These conditions subsequently increase the risks of cesarean delivery, perineal laceration, neonatal asphyxia, and birth trauma...[2]. Moreover, neonates born to mothers with gestational diabetes mellitus are at higher risk of developing complications compared with those born to non-GDM mothers, including hypoglycemia, respiratory distress, and jaundice related to prematurity. Among these, the most prominent complication is neonatal hypoglycemia, accounting for 15.3% according to Wielandt [3]. Therefore, to gain a comprehensive understanding of the obstetric outcomes in cases of gestational diabetes mellitus, we conducted this study "Obstetric management outcomes of patients with gestational diabetes mellitus delivering after 34 weeks at Nghe An Obstetrics and Pediatrics Hospital".

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2. MATERIAL AND METHODS

2.1. Study Subjects

- Study Population: Pregnant women diagnosed with gestational diabetes mellitus (GDM) who delivered after 34 weeks at Nghe An Obstetrics and Pediatrics Hospital from January 2022 to December 2023, meeting the inclusion and exclusion criteria.

- Inclusion Criteria:

+ Singleton pregnancy.

+ Gestational age ≥ 34 weeks 0 days.

+ Underwent an oral glucose tolerance test during pregnancy.

+ Complete and clear maternal and neonatal medical records, including administrative, clinical, and laboratory data before and after delivery.

- Exclusion Criteria:

+ Pregnant women with pre-existing diabetes diagnosed before pregnancy.

+ Pregnant women with diseases affecting glucose metabolism, such as Graves' disease, hypothyroidism, Cushing's syndrome, liver failure, or renal failure.

+ Incomplete or unclear medical records.

+ Women not meeting all sampling criteria.

2.2. Methods

The study employed a cross-sectional descriptive design, with the sample size calculated using the formula for estimating a single proportion with absolute precision:

$$n = Z^2_{1-\alpha/2} \frac{p(1-p)}{d^2}$$

In there:

+ n: The estimated sample size (unit: person).

+ $Z_{1-\alpha/2} = 1.96$ - representing the confidence coefficient of α = 0.05 corresponding to a 95% confidence interval.

+ p = 0.78: The proportion of cesarean deliveries among patients with gestational diabetes mellitus reported in the study by Nguyễn Mạnh Thắng and Hoàng Tuấn Linh (2020) at the National Hospital of Obstetrics and Gynecology [4].

+ d: The desired absolute error, is set to a value of d = 0.05

Based on the above formula, a minimum of 134 participants was required for the study. In practice, 150 cases meeting the inclusion criteria were enrolled.

2.3. Study Variables

To evaluate obstetric management outcomes in patients with gestational diabetes mellitus delivering after 34 weeks at Nghe An Obstetrics and Pediatrics Hospital, we analyzed the following variables: (1) general characteristics of the study population, including maternal age, residence, history of cesarean delivery, and obstetric comorbidities; (2) obstetric outcomes, including mode of delivery, gestational age at delivery, maternal complications, length of maternal hospital stay, and postpartum follow-up duration; (3) indications for cesarean delivery; and (4) neonatal outcomes, including birth weight, Apgar scores at 1 and 5 minutes, neonatal complications, and duration of neonatal intensive care unit (NICU) stay.

3. RESULT

Table 1. General characteristics of the study population

Characteristics	n= 150	%
Maternal age, years		
≤ 25 years	2	1,3
26 – 35 years	77	51,3
> 35 years	71	47,3
Mean maternal age		
(Mean ± SD) (Min – Max)	35,93 ± 5,58 (23 – 53)	
Place of residence		
Urban	38	25,0
Rural	112	75,0
History of cesarean delivery		
No	81	54,0
1 – 2 times	66	44,0
Three or more times	3	2,0
Current obstetric complications		
GDM managed with dietary modification	121	80,7
GDM on insulin therapy	29	19,3
Associated preeclampsia	16	10,7

Most pregnant women with gestational diabetes mellitus in this study were older than 25 years (98.7%). The majority resided in rural areas (75%), 46% had a history of cesarean delivery, and 10.7% were diagnosed with associated preeclampsia.

Table 2. Obstetric outcomes of patients with gestational diabetes mellitus delivering after 34 weeks

Results		n=150	%
Delivery method	Cesarean delivery	145	96,7
	Vaginal delivery	5	3,3
Gestational age at delivery	≤ 37 weeks	95	63,3
	> 37 weeks	55	36,7
Mean gestational age at delivery (weeks)	(Mean ± SD) (Min – Max)	36,34 ± 1,48 (34 – 39)	
Maternal complications	No	150	100
	Yes	0	0
Maternal hospital stay	Mean ± SD (Min – Max)	9,01 ± 5,75 (2 – 35)	
Postpartum follow-up duration	Mean ± SD (Min – Max)	5,37 ± 1,39 (2 – 11)	

The majority of pregnant women with gestational diabetes mellitus delivered by cesarean section (96.7%), with a mean gestational age at delivery of 36.34 ± 1.48 weeks. All participants had no maternal complications, and the mean duration of postpartum follow-up was 5.37 ± 1.39 days.

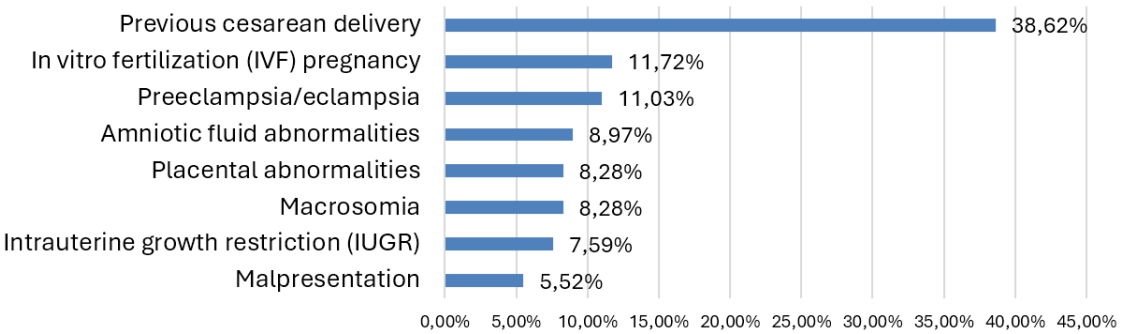

Chart 1. Indications for Cesarean Delivery

The most common indication for cesarean delivery was a history of previous cesarean section (38.62%). Other indications, such as macrosomia, amniotic fluid abnormalities, or placental disorders, accounted for approximately 8–9% of cases each

Table 3. Neonatal outcomes of infants born to mothers with gestational diabetes mellitus delivering after 34 weeks

Characteristics	n=150	%
Neonatal birth weight (g)		
< 2500	36	24,0
2500 – 3400	100	66,7
3500 – 3900	12	8,0
> 4000	2	1,3
Mean neonatal birth weight (g)		
(Mean ± SD) (Min – Max)	2770,00 ± 502,04 (1400 – 5300)	
1-minute Apgar score		
0 – 3 score	0	0
4 – 6 score	9	6,0
7 – 10 score	141	94,0
5-minute Apgar score		
0 – 3 điểm	0	0
4 – 6 điểm	2	1,3
7 – 10 điểm	148	98,7
Neonatal complications		
None	131	87,3
Hypoglycemia	5	3,3
Respiratory distress	9	6,0
Jaundice	4	2,7
Congenital anomalies	1	0,7
Neonatal death	0	0
Duration of NICU stay (n = 17)		
Mean ± SD (Min – Max)	6,65 ± 2,85 (3 – 13)	

The majority of neonates weighed between 2,500 - 3,400 g (66.7%). Most had favorable 1- and 5-minute Apgar scores ranging from 7 to 10 (>94%). The most common neonatal complications were respiratory distress (6%) and hypoglycemia (3.3%). Seventeen neonates required NICU admission, with a mean stay of 6.65 ± 2.85 days.

4. DISCUSSION

This study was conducted based on the medical records of 150 patients with gestational diabetes mellitus who delivered after 34 weeks at Nghe An Obstetrics and Pediatrics Hospital from 2022 to 2023. Most participants were older than 25 years (98.6%), with a mean age of 35.93 ± 5.58 years, and no cases under 18 years were recorded. The maternal age in this study is consistent with the findings of Nguyễn Mạnh Thắng in Hanoi (2021) [5, 6]. The maternal age distribution in this study aligns with age as a risk factor for gestational diabetes mellitus (GDM), as reported by Caliskan et al. (2004) in Turkey. Most participants were over 25 years, which corresponds to the typical childbearing period.

A majority of participants (75%) resided in rural areas, three times higher than those living in urban areas. This reflects the socioeconomic characteristics of Nghe An province, a low-income region with a low urbanization rate (only 21.5% of the population living in urban areas). Regarding obstetric history, 54% of patients had no prior cesarean delivery, 44% had undergone 1–2 cesarean sections, and 2% (3/150 cases) had undergone three or more. While a history of cesarean delivery does not influence the risk of developing GDM, it is an important factor affecting the mode of delivery, contributing to the higher cesarean section rate observed among patients with GDM in this study.

In terms of current obstetric management of gestational diabetes mellitus (GDM), 80.7% of patients were treated with dietary modification and daily physical activity, whereas 19.3% received insulin therapy. This distribution aligns with the results reported by Nguyen Thi Mai Ngoc (2023), in which 92.3% of patients were managed with diet and 7.7% received combined insulin therapy [7]. This can be explained by the pathophysiology of gestational diabetes mellitus (GDM). GDM results from physiological insulin resistance, which typically develops and progressively increases from mid-pregnancy. Consequently, most pregnant women exhibit mild hyperglycemia that can often be controlled with dietary modification. According to recommendations from the American Diabetes Association and the Vietnam Ministry of Health, insulin therapy is indicated only when glycemic targets are not achieved through dietary measures. The timing and dosage of insulin are determined by endocrinologists based on the severity of hyperglycemia and individual glycemic control.

In our study, 16 out of 150 patients (10.7%) were diagnosed with GDM complicated by preeclampsia, with a mean gestational age at diagnosis of 35.94 ± 1.84 weeks. This finding is consistent with the study by Le Van Dat (2022) at Hanoi Obstetrics Hospital, which reported a 10.57% incidence of preeclampsia among patients with GDM, as well as with previous international studies reporting a preeclampsia rate of approximately 12% among women with GDM, higher than the 8% observed in non-GDM women [8, 9]. The coexistence of preeclampsia and gestational diabetes mellitus (GDM) may affect fetal birth weight, the mode of delivery, and neonatal outcomes in the study population. Table 3.2 presents the obstetric outcomes of patients with GDM delivering after 34 weeks at Nghe An Obstetrics and Pediatrics Hospital. Among the 150 participants, 145 (96.7%) underwent cesarean delivery. The cesarean rate in our study is comparable to that reported by Nguyen Minh Anh (90.9%) and higher than in some other studies. Overall, the cesarean section rate among women with GDM in Vietnam is relatively high, exceeding 70% [10, 11]. Cesarean delivery also predominates over vaginal delivery among women with gestational diabetes mellitus (GDM). A meta-analysis of 7.5 million GDM cases worldwide by Wenrui Ye et al. (2022) reported that GDM increases the risk of cesarean delivery by 1.16 times compared with normoglycemic pregnancies (95% CI, 1.03–1.32) [12].

Figure 3.1 illustrates the indications for cesarean delivery. The most frequent indication was a history of previous cesarean section, accounting for 38.62%. Indications related to complications of gestational diabetes mellitus (GDM), such as malpresentation, macrosomia, amniotic fluid abnormalities, and associated preeclampsia, accounted for approximately 33.8% of cases. Social factors, including IVF pregnancy and maternal or family request for cesarean, contributed 11.72%. These data suggest that GDM itself is not a direct indication for cesarean delivery. The majority of cesarean deliveries were due to a prior cesarean, exceeding 30% in all cases. The second most common reasons were GDM-related complications, including macrosomia, malpresentation, and abnormal amniotic fluid, which complicate labor, increase the risk of prolonged labor, fetal distress, birth trauma, and postpartum uterine atony, thereby necessitating cesarean delivery to ensure maternal and fetal safety.

The mean gestational age at delivery in our study was 36.34 ± 1.48 weeks, ranging from 34 to 39 weeks, with no post-term deliveries observed. The most common gestational age category at birth was <37 weeks, accounting for 63.3% of cases. In contrast, the majority of GDM cases in the studies by Nguyen Minh Anh and Nguyen Viet Tri delivered after 37 weeks, at 83.6% and 75.9%, respectively [10, 13]. The difference can be explained by the fact that 36.4% of participants in our study were admitted with premature rupture of membranes or threatened preterm labor, resulting in a lower gestational age at delivery compared to other studies. Additionally, Wenrui Ye (2022) reported that women with gestational diabetes mellitus (GDM) have a 1.51-fold higher risk of preterm birth compared with normoglycemic pregnancies (95% CI, 1.26 – 1.80) [12]. Preterm birth (<37 weeks) may particularly increase the risk of neonatal complications, such as low birth weight, respiratory distress, or neonatal jaundice.

In our study, we monitored maternal obstetric complications, including severe perineal lacerations, postpartum hemorrhage, and postpartum infections. The incidence of maternal complications in our cohort was 0%. Notably, the rate of complications, especially

postpartum hemorrhage, was lower than that reported by Nguyen Minh Anh (12.1%) and Nguyen Thi My Hanh (0.9%) [10, 14]. However, the differences between our results and those reported by other authors may be attributed to the relatively small sample size in our study, as well as a lower incidence of macrosomia (8.28%) compared to 24.2% and 13.3% reported in the other two studies [10, 14].

The mean hospital stay for women with gestational diabetes mellitus (GDM) in our study was 9 days, with the longest stay lasting 35 days. This case involved a 32-year-old primiparous woman with an IVF pregnancy who was admitted at 32 weeks of gestation due to threatened preterm labor. She remained hospitalized for 4 weeks, and at 36 weeks, upon signs of labor, she underwent a planned cesarean section, delivering a male infant weighing 3,000 g with Apgar scores of 8 and 9. The mother was discharged 5 days later. The mean duration of postpartum follow-up for the study participants was 5.37 ± 1.39 days, which is comparable to the findings reported by JS. Wang (2022), with a mean of 4.84 ± 5.42 days [15].

Table 3.3 presents the neonatal outcomes of the study population. The mean birth weight of neonates in our study was approximately 2,770 g, which is lower than that reported by Nguyen Manh Thang (3433 g) and Nguyen Thi Mai Ngoc (3262 g) [5, 7]. This difference can be explained by the fact that 57.3% of participants in our study delivered preterm (<37 weeks), with the most common neonatal birth weight ranging from 2,500 to 3,400 g (66.7%). The incidence of macrosomia (>4,000 g) in our study was relatively low (1.3%). Macrosomia in women with gestational diabetes mellitus (GDM) is a common complication that increases the risk of cesarean delivery, complex perineal trauma, and neonatal asphyxia, while adequate glycemic control can significantly reduce its occurrence.

Most neonates in our study had favorable Apgar scores, ranging from 7 to 10, with 94% at 1 minute and 98.7% at 5 minutes. These findings are consistent with those reported by Nguyen Manh Thang, in which the proportion of neonates with Apgar scores <7 at 1 and 5 minutes was low, at 2.94% and 1.18%, respectively [5]. These findings indicate that most neonates born to mothers with gestational diabetes mellitus (GDM) after 34 weeks had sufficient respiratory maturity, resulting in a low incidence of neonatal respiratory distress, which was 6% in our study.

Regarding other neonatal complications, the majority of neonates were healthy without any complications (87.3%). Among those with complications, respiratory distress was the most common (6%), all occurring in preterm infants. Hypoglycemia was observed in 3.3% of cases, jaundice in 2.7%, and congenital anomalies in 0.7%. Notably, among the 5 neonates with hypoglycemia, 2 cases were severe (1.3%), and 3 cases were mild to moderate (2%). According to Jane (2012), the incidence of neonatal hypoglycemia among infants of mothers with GDM was 14.02%, compared with 0.7% in the non-GDM group, nearly 20 times higher [2]. These findings indicate that the risk of neonatal hypoglycemia is relatively high among infants born to mothers with gestational diabetes mellitus (GDM); however, our study lacked a control group, so the magnitude of this difference could not be determined.

In addition, 17 out of 150 neonates (11.3%) required monitoring and treatment in the neonatal intensive care unit (NICU). The mean duration of NICU stay was 6.65 ± 2.85 days, ranging from 3 to 13 days. The longest NICU admission involved a male neonate, fourth child, born at 34 weeks, weighing 2,700 g, with Apgar scores of 5 and 6, and a blood glucose level of 1.9 mmol/L. The infant was admitted due to prematurity, respiratory distress, and hypoglycemia. After 13 days of treatment, the neonate stabilized and was discharged.

5. CONCLUSIONS

In this study, the majority of women with gestational diabetes mellitus (GDM) delivering after 34 weeks were over 25 years of age, and 46% had a history of previous cesarean delivery. Approximately four times as many patients were managed with dietary modification compared to insulin therapy, and 10.7% were diagnosed with concomitant preeclampsia. Cesarean section was the predominant mode of delivery (96.7%), primarily due to a history of prior cesarean or GDM-related complications, including macrosomia, malpresentation, and abnormal amniotic fluid, often resulting in preterm delivery (<37 weeks). No maternal obstetric complications were observed. The mean neonatal birth weight was 2,770 g, with the majority of neonates demonstrating favorable Apgar scores of 7–10 (>94%). The most common neonatal complications were respiratory distress (6%) and hypoglycemia (3.3%).

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