

Breastfeeding Practices among Postpartum Women with and without a History of Gestational Diabetes Mellitus: A Prospective Study

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Objective: To compare breastfeeding (BF) practices, particularly exclusive BF (EBF), among women with and without a history of gestational diabetes mellitus (GDM) during the first six postpartum months and assess the impact of EBF on offspring weight from birth to six months postpartum.

Materials and Methods: The present study was a prospective study that included 244 women, with 123 with a history of GDM (GDM group) and 121 without a history of GDM (non-GDM group). All participants were first interviewed on the discharge date and then via telephone at 1, 2, 3, 4, 5, and 6 months postpartum. BF practices were classified as EBF, partial BF (PBF), or no BF. Data on infant weight at six months were evaluated.

Results: Upon hospital discharge, women mostly practiced PBF with 53.6% PBF versus 30.1% EBF in the GDM group and 48.8% PBF versus 38.0% EBF in the non-GDM group. However, EBF was more commonly practiced than PBF, during the first six months postpartum. The 6-month EBF rates for the GDM and non-GDM groups were 28.4% and 17.4%, respectively ($p=0.039$). In a multivariate analysis, only the intended EBF period was a factor that significantly impacted 6-month EBF rates (adjusted odds ratio 3.49 and 95% confidence interval 1.48 to 8.22). EBF for six months resulted in reduced weight gain during the first six months of life among offspring of women in both groups.

Conclusion: The GDM group practiced EBF for six months postpartum more frequently than the non-GDM group. However, a history of GDM was not an independent predictor of EBF success over six months. EBF demonstrated lower offspring weight gain from birth to six months postpartum for women with and without a history of GDM. These findings may be used to design targeted educational programs for informed postpartum BF practices.

Keywords: Breastfeeding practices; Breastmilk; Exclusive breastfeeding; Gestational diabetes mellitus; Infant weight gain; Postpartum

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Breastfeeding (BF) has many benefits for women and infants⁽¹⁻³⁾. The World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) recommend that postpartum women should practice exclusive BF (EBF) for their infants during the first six months of life and continue BF until two years of age or older⁽⁴⁾. The global target for EBF for infants younger than six months has been set to at least 70% by 2030⁽⁵⁾.

Despite international efforts to promote BF,

only 41% of infants younger than six months receive EBF globally⁽⁵⁾. It has been reported that postpartum women with metabolic disorders, specifically gestational diabetes mellitus (GDM), are less likely to intend to breastfeed compared to women without a history of GDM⁽⁶⁾. The lower likelihood of intending to breastfeed may influence the initiation and continuation of BF⁽⁷⁾, thereby negatively impacting maternal and infant health. Several studies have compared BF rates or durations of postpartum women with and without a history of GDM⁽⁸⁻¹⁴⁾. However, the criteria used to define BF among these studies have varied and included EBF, any BF, or partial BF (PBF). The time points when BF was evaluated varied and included discharge, 1 month, 1.5 to 2.5 months, 3 months, 6 months, and 12 months. To date, no longitudinal studies have compared EBF rates beginning from the first few days of life to six months of age for women with and without history of GDM.

Because EBF provides better health benefits than PBF in terms of improving maternal glucose and

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lipid profiles and preventing childhood obesity⁽¹⁵⁻¹⁸⁾, it is important to enable postpartum women with a history of GDM to complete six months of EBF. Presently, there is little information about the current EBF practice among women with a history of GDM.

The objective of the present study was to compare BF practices, particularly EBF, among women with and without a history of GDM during the first six months postpartum. The authors also investigated factors associated with the completion of six months of EBF and evaluated the impact of six months of EBF on the weight gain from birth to six months among offspring of women with and without a history of GDM.

Materials and Methods

Study setting and participants.

The present prospective questionnaire-based study was performed at the Faculty of Medicine Vajira Hospital, Navamindradhiraj University, Bangkok, Thailand. The present study was approved by the Vajira Institutional Review Board (certificate of approval no. 077/2563) and performed in accordance with the Declaration of Helsinki. All participants provided written informed consent before participation.

The study population consisted of postpartum women who had a pregnancy complicated by GDM (GDM group) and postpartum women who had normoglycemia during pregnancy (non-GDM group) delivered at the authors' institution between July 5, 2020 and July 31, 2021. Participants were included if they were 18 years or older, delivered a singleton liveborn baby, and agreed to participate in the present study. Participants in the GDM group were required to undergo blood glucose testing performed by the institutional laboratory using the Carpenter and Coustan criteria for GDM⁽¹⁹⁾. The exclusion criteria were pregestational diabetes, HIV infection, untreated active tuberculosis, chemotherapy or radiation treatment, and breast abscesses for women and galactosemia for infants. Women whose infant died before the age of six months and those who could not be contacted via telephone before the end of the 6-month period were also excluded from the present study.

Sample size

Sample size calculations were performed based on the primary and secondary outcomes of the study. Regarding the primary outcome, the authors assumed that 62.2% of postpartum women with a history of

GDM and 75.4% of postpartum women without a history of GDM practiced EBF at the time of hospital discharge, as reported by a previous study⁽⁹⁾. Using a confidence level of 95% and a margin of error of 15% of the expected proportion, 112 women with a history of GDM and 60 women without a history of GDM were required for the study. Regarding the secondary outcomes, no study has compared the impact of six months of EBF on the weight gain from birth to six months among offspring of women with and without history of GDM. Thus, the authors used data from a study conducted on healthy women, which showed that the mean weight gains during the first 6 months of life of infants who received EBF for six months and those who did not receive EBF were 2.9 ± 0.3 kg and 3.8 ± 0.3 kg, respectively⁽²⁰⁾. With a 95% confidence level and a margin of error of 5% of the mean, 17 women who practiced EBF for six months and 10 women who did not practice six months of EBF were required. Ultimately, the sample size that was calculated based on the primary outcome was selected because it yielded a larger sample. The authors added 20% to the calculated sample size to compensate for the exclusion criteria. Therefore, 135 women with a history of GDM and 72 women without a history of GDM were needed. Equal numbers of participants were allocated to each group. Hence, the final sample size required was 270 postpartum women.

Standard care of postpartum women with a history of GDM and their babies

As part of the standard care of postpartum women with a history of GDM at the postpartum ward, the women were educated about the positive health effects of EBF for themselves and their offspring, which include improving maternal glucose and lipid profiles and minimizing childhood obesity. These women were scheduled for a follow-up visit at six weeks postpartum. They were also advised to bring their babies for follow up at 1, 2, 4, and 6 months of age.

Data collection and outcome measures

Potential participants were approached by a researcher on day 2 after delivery. Each woman in the non-GDM group was matched to a woman in the GDM group by date of delivery, gestational age at delivery (less than 37 weeks versus 37 weeks or more), and mode of delivery (vaginal delivery versus cesarean delivery). Participants who met the inclusion criteria were interviewed by one of the researchers on the discharge date. Data collected from

the medical charts and from the interview included maternal demographic characteristics, obstetric and neonatal data, duration of maternity leave, intended EBF period, milk quantity, use of in-hospital formula supplementation, and BF problems.

Subsequent interviews were performed by telephone at the end of month 1, month 2, month 3, month 4, month 5, and month 6 after delivery. The follow-up interview included questions about BF practice, milk quantity, time when infant formula or other liquids or foods was commenced, and main reason for BF cessation. Data regarding infant weight at age 6 months was obtained from hospital electronic medical records.

The authors classified BF practices into three categories as EBF, PBF, or no BF. EBF was considered when the infant was fed only breast milk without additional foods or liquids except oral rehydration solution, vitamin/mineral drops, vitamin/mineral syrups, or medicines⁽²¹⁾. PBF was considered when the sources of nourishment were breast milk and any other food or liquid, including infant formula⁽²²⁾. No BF referred to the use of any food or liquid except breast milk.

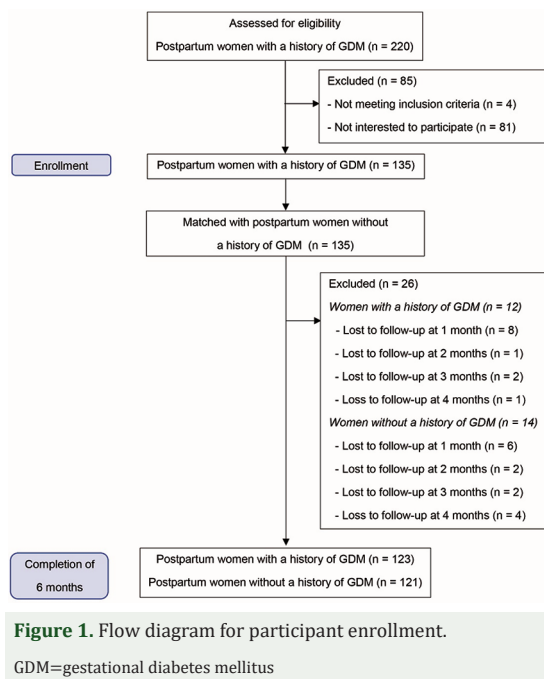
The primary outcome measure was BF practices, including EBF, PBF, and no BF. The secondary outcomes were factors associated with the completion of six months of EBF and postnatal infant weight gain in relation to BF intensity, with or without the completion of six months of EBF.

Statistical analysis

All analyses were performed using IBM SPSS Statistics for Windows, version 22.0 (IBM Corp., Armonk, NY, USA). Categorical variables were presented as numbers and percentages. Continuous variables are described as the means and standard deviations. Group comparisons were made using the chi-squared test for categorical variables and Student's t-test for continuous variables. Covariates that were significantly associated with the completion of six months of EBF by univariate analyses were entered into a multivariate logistic regression model to determine the odds ratios with 95% confidence intervals. Statistical significance was defined as p-value less than 0.05.

Results

Among 270 women, including 135 with a history of GDM and 135 without a history of GDM, who were recruited, 26 including 12 in the GDM group and 14 in the non-GDM group did not respond to the authors'



communication. Hence, the final sample included 244 women (Figure 1). Baseline characteristics of women who did not respond to the authors' communication and women who completed the study were not different ($p>0.05$).

The demographic and clinical characteristics of the study participants are presented in Table 1. Women in the GDM group were significantly older and more likely to be obese than women in the non-GDM group. Other characteristics of women in both groups were comparable.

Figure 2 compares BF practices from the first few days of life to six months of age for infants of postpartum women in the GDM and non-GDM groups. Rates of EBF on the discharge date and at the completion of month 1, month 2, and month 3 after delivery were not significantly different between groups. From months 4 to 6, a significantly higher percentage of women in the GDM group than in the non-GDM group practiced EBF with month 4 at 40.7% versus 26.4% ($p=0.019$), month 5 at 36.6% versus 21.5% ($p=0.009$), and month 6 at 28.5% versus 17.4% ($p=0.039$). The mean durations \pm standard deviations, of EBF practice among mothers with and without GDM were 2.6 ± 2.6 months and 1.9 ± 2.3 months, respectively ($p=0.039$).

The rates of PBF from the discharge date until the end of month 6 were similar between groups. Rates of no BF progressively increased from month 1

Table 1. Characteristics of postpartum women with and without a history of gestational diabetes mellitus

Characteristic	Total (n=244)	GDM group (n=123)	Non-GDM group (n=121)	p-value
Age (years); mean±SD	28.8±6.3	31.7±5.8	25.9±5.2	<0.001
Parity; n (%)				0.200
Primipara	97 (39.8)	44 (35.8)	53 (43.8)	
Multipara	147 (60.2)	79 (64.2)	68 (56.2)	
Body mass index (kg/m ²); mean±SD	24.2±5.6	25.8±6.0	22.5±4.5	<0.001
Occupation; n (%)				0.877
Employee	120 (49.2)	62 (50.4)	58 (47.9)	
Business owner	31 (12.7)	17 (13.8)	14 (11.6)	
Public officer	2 (0.8)	1 (0.8)	1 (0.8)	
Other (housewife or unemployed)	91 (37.3)	43 (35.0)	48 (39.7)	
Education; n (%)				0.087
Primary education	47 (19.3)	21 (17.1)	26 (21.5)	
Secondary education	145 (59.4)	70 (56.9)	75 (62.0)	
College	23 (9.4)	11 (8.9)	12 (9.9)	
Bachelor's degree or higher	29 (11.9)	21 (17.1)	8 (6.6)	
Duration of maternity leave; n (%)				0.563
<6 months	85 (34.8)	45 (36.6)	40 (33.1)	
≥6 months	159 (65.2)	78 (63.4)	81 (66.9)	
Intended exclusive breastfeeding period; n (%)				0.057
<6 months	73 (29.9)	30 (24.4)	43 (35.5)	
≥6 months	171 (70.1)	93 (75.6)	78 (64.5)	
In-hospital formula supplementation; n (%)				0.191
No	83 (34.0)	37 (30.1)	46 (38.0)	
Yes	161 (66.0)	86 (69.9)	75 (62.0)	
In-hospital breastfeeding problem; n (%)				0.191
No	83 (34.0)	37 (30.1)	46 (38.0)	
Yes	161 (66.0)	86 (69.9)	75 (62.0)	
• Insufficient milk supply	159 (65.2)	86 (69.9)	73 (60.3)	
• Nipple inversion or retraction	2 (0.8)	0 (0)	2 (1.7)	
Gestational age at delivery; n (%)				0.877
<37 weeks	19 (7.8)	9 (7.3)	10 (8.3)	
≥37 weeks	225 (92.2)	114 (92.7)	111 (91.7)	
Mode of delivery; n (%)				0.878
Vaginal delivery	144 (59.0)	72 (58.5)	72 (59.5)	
Cesarean delivery	100 (41.0)	51 (41.5)	49 (40.5)	
Infant birthweight (g); mean±SD	3109.0±453.3	3155.4±440.8	3061.8±462.8	0.107
Infant sex; n (%)				0.903
Male	128 (52.5)	65 (52.8)	63 (52.1)	
Female	116 (47.5)	58 (47.2)	58 (47.9)	

GDM=gestational diabetes mellitus; SD=standard deviation

to month 6 postpartum in the GDM and non-GDM groups. The main reasons for BF cessation in the GDM and non-GDM groups were insufficient milk supply with 37.4% and 32.2%, respectively, and the need to return to work with 7.3% and 12.4%, respectively.

A multivariate analysis adjusted for potential confounding factors revealed that GDM was not

significantly associated with the completion of six months of EBF (Table 2). In contrast, the significant factor impacting the completion of six months of EBF was the intended EBF period (adjusted odds ratio 3.49, 95% confidence interval 1.48 to 8.22).

All 244 offspring of 244 women included for analysis were followed up at six months of age. For infants born to women without a history of GDM,

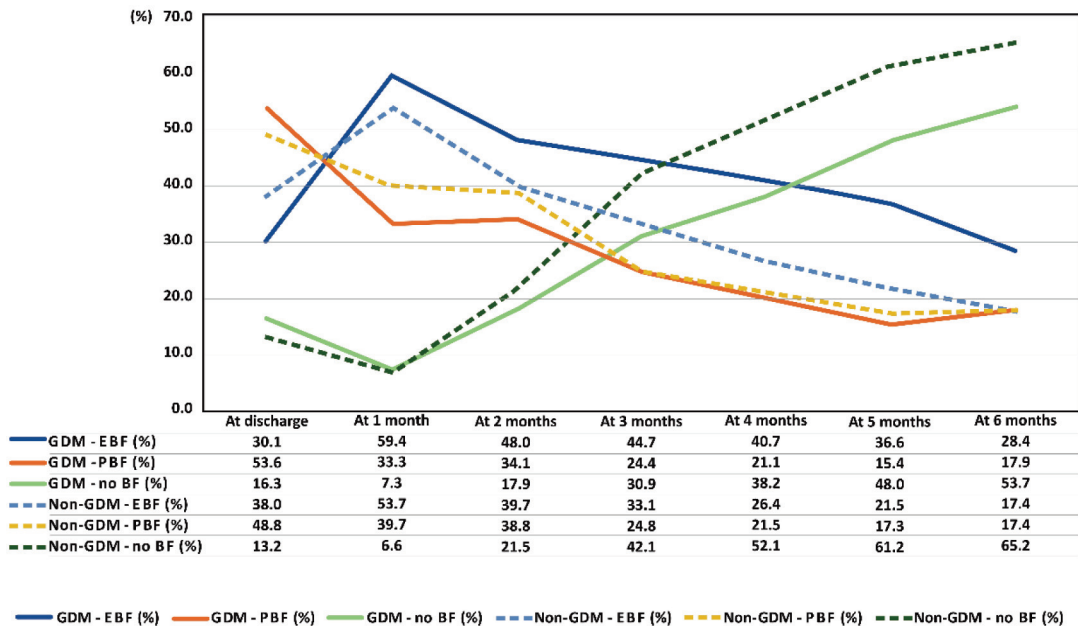


Figure 2. Breastfeeding practices during the first 6 months postpartum of women with and without a history of gestational diabetes mellitus.

BF=breastfeeding; EBF=exclusive breastfeeding; GDM=gestational diabetes mellitus; PBF=partial breastfeeding

Table 2. Univariate and multivariate analyses of factors associated with 6-month exclusive breastfeeding

Variable	6-month EBF		p-value	Crude OR (95% CI)	Adjusted OR ^a (95% CI)
	Yes (n=56)	No (n=188)			
GDM status; n (%)			0.039		
No	21 (37.5)	100 (53.2)		Reference	1.00
Yes	35 (62.5)	88 (46.8)		1.89 (1.03 to 3.49)	1.25 (0.61 to 2.53)
Age (years); mean±SD	30.8±5.9	28.1±6.2	0.005	-	1.06 (1.00 to 1.12)
Parity; n (%)			0.695		
Primipara	21 (37.5)	76 (40.4)		Reference	-
Multipara	35 (62.5)	112 (59.6)		1.13 (0.61 to 2.09)	-
Body mass index (kg/m ²); mean±SD	24.0±4.9	24.3±5.8	0.696	-	-
Education; n (%)			0.755		
Primary education	12 (21.4)	35 (18.6)		Reference	-
Secondary education	31 (55.4)	114 (60.7)		0.79 (0.37 to 1.71)	-
College	7 (12.5)	16 (8.5)		1.28 (0.42 to 3.85)	-
Bachelor's degree or higher	6 (10.7)	23 (12.2)		0.76 (0.25 to 2.31)	-
Duration of maternity leave; n (%)			0.630		
<6 months	18 (32.1)	67 (35.6)		Reference	-
≥6 months	38 (67.9)	121 (64.4)		1.17 (0.62 to 2.21)	-
Intended exclusive breastfeeding period; n (%)			0.001		
<6 months	7 (12.5)	66 (35.1)		Reference	1.00
≥6 months	49 (87.5)	122 (64.9)		3.79 (1.62 to 8.83)	3.49 (1.48 to 8.22)
In-hospital formula supplementation; n (%)			0.204		
No	23 (41.1)	60 (31.9)		Reference	-
Yes	33 (58.9)	128 (68.1)		0.67 (0.36 to 1.24)	-

CI=confidence interval; EBF=exclusive breastfeeding; GDM=gestational diabetes mellitus; OR=odds ratio; SD=standard deviation

^a Adjusted for the other variables that were significant by univariate analysis

Table 3. Postnatal weight gain from birth to 6 months of offspring of women with and without a history of gestational diabetes mellitus

	Offspring of women with a history of GDM			Offspring of women without a history of GDM		
	Completion of 6 months of EBF (n=35); mean±SD	Without completion of 6 months of EBF (n=88); mean±SD	p-value	Completion of 6 months of EBF (n=21); mean±SD	Without completion of 6 months of EBF (n=100); mean±SD	p-value
Weight gain from birth to 6 months (g)						
All infants	4,111.0±1,004.0	4,546.1±901.7	0.030	3,874.8±553.1	4,327.5±844.3	0.020
Male infants	4,668.5±941.0	4,776.8±937.5	0.706	4,029.6±573.8	4,475.3±916.0	0.049
Female infants	3,667.1±790.6	4,377.3±827.2	0.002	3,704.5±502.5	4,167.4±735.3	0.026

EBF=exclusive breastfeeding; GDM=gestational diabetes mellitus; SD=standard deviation

those who received EBF during the first six months of life experienced less weight gain from birth to six months than those who did not receive EBF (Table 3). These results persisted even when the data of male and female infants were separately analyzed. The effect of the completion of six months of EBF on reduced postnatal weight gain was also observed for offspring of women with a history of GDM. However, when a subgroup analysis was performed according to the gender the infants, this effect influenced only female infants.

Discussion

During the present prospective analysis of BF practices among postpartum women with and without a history of GDM, the authors found that the GDM history did not significantly influence the completion of six months of EBF. The significant factor that impacted the completion of six months of EBF was the intended EBF period. The completion of six months of EBF was associated with reduced weight gain from birth to six months among the offspring of women with and without a history of GDM.

Some studies that compared BF rates among postpartum women with and without a history of GDM have reported various results⁽⁸⁻¹²⁾. Three cross-sectional studies conducted in North America and Australia showed significantly lower rates of EBF on the date of discharge or at 1.5 to 2.5 months postpartum among women with a history of GDM compared to their counterparts without a history of GDM⁽⁸⁻¹⁰⁾. However, another questionnaire survey of American women reported that the rates of BF initiation were not significantly different between the two groups of women. However, the rate of BF continuation until two months postpartum was lower among women with a history of GDM⁽¹¹⁾. Another prospective study with a longer evaluation period performed in Vietnam reported no significant differences in BF rates on the discharge date and at

1, 3, and 6 months after delivery for women with and without a history of GDM. However, they reported a significantly lower rate of any BF at 12 months postpartum for women with a history of GDM⁽¹²⁾.

The different BF practices among women in the present study and in other studies might be associated with many factors. In addition to the dissimilar sociocultural backgrounds of the populations studied, the BF types assessed were different. The three studies conducted in North America and Australia and the present study primarily focused on EBF, whereas the questionnaire survey of American women and the Vietnamese population-based study examined any BF practice. The BF durations that were assessed were also dissimilar. The study performed in Vietnam and the present study explored BF during a longer duration after delivery, at 12 and six months, respectively. However, the other three studies investigated short-term BF outcomes at 2 months or less to 2.5 months.

By multivariate analysis, the result of the present study demonstrated that the GDM history was not an independent factor for the completion of six months of EBF. Nevertheless, the authors observed that women with a history of GDM practiced EBF for a longer duration than women without a history of GDM at 2.6±2.6 months versus 1.9±2.3 months, which could be explained by the fact that all GDM-affected women who delivered at the authors' hospital were educated in the postpartum ward about the benefits of EBF in terms of improving maternal and childhood glucometabolic profiles. The information the women received might have increased their awareness of the importance of EBF and motivated some of them to practice EBF for a longer duration.

The authors observed an association between the intended EBF period and the completion of six months of EBF. This finding was consistent with the results of previous studies that investigated factors affecting BF practices of either a group of women with and without a history of GDM or a group of

women with a history of GDM^(23,24). Unlike a prior study performed in Thailand⁽²³⁾, the authors found no effect of the duration of maternity leave on six months EBF. This might be because the women in the present study who intended to complete six months of EBF, but had less than six months of maternity leave, could find daycare or suitable facilities that supported breastmilk expression and storage. Likewise, the authors found no association between in-hospital formula supplementation and the completion of six months of EBF. The explanation might be that most of the women with and without a history of GDM experienced an increased amount of breastmilk after hospital discharge. Therefore, they continued to perform BF.

Only one study has compared mean weight changes during infancy of the offspring of women with and without a history GDM⁽²⁵⁾. In the Singaporean population-based study, EBF or predominant BF for four months or more compared with no BF resulted in reduced weight gain during the first year of life among offspring of the non-GDM group, but not among offspring of the GDM group⁽²⁴⁾. During the present study, the authors focused on weight changes from birth to six months of age because infants generally start solid foods at the age of six months. As a result, various types and amounts of foods could confound the effect of EBF on infant growth after the age of six months. The authors found that the completion of six months of EBF was associated with reduced weight gain during the first six months of life of the offspring of the non-GDM and GDM groups. The inconsistent findings between the present study and the study performed in Singapore might have been caused by the dissimilar types and durations of BF studied. The present study focused on the effect of the completion of six months of EBF. However, the study performed in Singapore assessed the effects of either EBF or predominant BF for four months or more. Additionally, the time points at which infant weight change was evaluated were dissimilar. The present study assessed weight changes at six months of age, whereas the study performed in Singapore determined weight changes from birth through one year of age.

The present study findings have implications for clinical practice. The results indicating that the intended EBF period positively influence the completion of six months of EBF are useful for developing counseling strategies to enable women to initiate BF during the postpartum period and continue EBF. The rebound of EBF rates at one month

(relative to at discharge), which appears to be higher in women with a history of GDM suggests the role of increased BF support in a hospital for GDM-affected women, and can be explained by the higher risk for delayed lactogenesis in diabetic women⁽²⁶⁾. The authors' observation of the impact of the completion of six months of EBF on reduced weight gain from birth to six months of age among infants of the GDM group is of particular clinical relevance because of the associations between the duration and intensity of BF and the risk of health problems, such as childhood obesity, for the offspring. These findings could translate to improved and specific counseling programs focused on EBF, especially for women with a history of GDM.

The strengths of the present study included the use of cited BF definitions. Moreover, the authors had measured BF each month in a way that captured BF status at that time, irrespective of earlier feeding status, and therefore captured women who supplemented early on but were able to move to EBF by the first month postpartum. Furthermore, the present study included contemporaneous women without a history of GDM who were matched to women with a history of GDM to reduce the selection bias. Additionally, this is the first study to separately analyze the effect of EBF on infant weight changes based on infant sex and GDM history.

The present study also had limitations. The authors were unable to randomly allocate participants into one group who practiced six months of EBF and one group who did not practice six months of EBF because this was illogical and unethical. As a result, this might have affected the observed outcomes, specifically infant weight change, because the authors could not rule out the dissimilar characteristics of the amount and quality of the milk intake between groups. Moreover, participants who did not complete the entire follow-up period were excluded. However, because the characteristics of women who did not respond to the authors' communication and women who completed the study were not different, the effect on outcome estimations was minimal.

Conclusion

The GDM history was not an independent factor for the completion of six months of EBF. The rates of 6-month EBF among women with and without a history of GDM were less than 30%. This rate is much lower than the 2030 global target of 70%. However, the indication that EBF performed for a duration of six months reduced infant weight gain should be used

to design targeted educational programs to improve EBF practices, especially for women with a history of GDM.

What is already known on this topic?

BF has many benefits for women and infants. However, the global rate of 6-month EBF remains suboptimal.

What does this study add?

The intended EBF period, but not a history of GDM, is the factor that positively influences the completion of six months EBF. EBF for the first six months of life can slow postnatal infant weight gain among offspring of women with and without a history of GDM. This information can help formulate policies on optimal postnatal infant feeding and care, especially for those affected by the potential metabolic impacts of GDM.

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Conflicts of interest

The authors declare no conflicts of interest.

References

1. Victora CG, Bahl R, Barros AJ, França GV, Horton S, Krasevec J, et al. Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. *Lancet* 2016;387:475-90.
2. Mildon A, Francis J, Stewart S, Underhill B, Ng YM, Rousseau C, et al. High levels of breastmilk feeding despite a low rate of exclusive breastfeeding for 6 months in a cohort of vulnerable women in Toronto, Canada. *Matern Child Nutr* 2022;18:e13260.
3. Tanase-Nakao K, Arata N, Kawasaki M, Yasuhi I, Sone H, Mori R, et al. Potential protective effect of lactation against incidence of type 2 diabetes mellitus in women with previous gestational diabetes mellitus: A systematic review and meta-analysis. *Diabetes Metab Res Rev* 2017;33:e2875.
4. UNICEF. The State of the World's Children 2019. Children, food and nutrition: Growing well in a changing world [Internet]. 2019 [cited 2023 Apr 20]. Available from: <https://www.unicef.org/media/63016/file/SOWC-2019.pdf>.
5. World Health Organization United Nations Children's Fund (UNICEF). Global breastfeeding scorecard, 2019: increasing commitment to breastfeeding through funding and improved policies and programmes [Internet]. 2019 [cited 2023 Apr 20]. Available from: <https://apps.who.int/iris/handle/10665/326049>.
6. Loewenberg Weisband Y, Rausch J, Kachoria R, Gunderson EP, Oza-Frank R. Hospital supplementation differentially impacts the association between breastfeeding intention and duration among women with and without gestational diabetes mellitus history. *Breastfeed Med* 2017;12:338-44.
7. Laisiriruangrai P, Wiriyasirivaj B, Phaloprakarn C, Manusirivithaya S. Prevalence of exclusive breastfeeding at 3, 4 and 6 months in Bangkok Metropolitan Administration Medical College and Vajira Hospital. *J Med Assoc Thai* 2008;91:962-7.
8. Finkelstein SA, Keely E, Feig DS, Tu X, Yasseen AS 3rd, Walker M. Breastfeeding in women with diabetes: lower rates despite greater rewards. A population-based study. *Diabet Med* 2013;30:1094-101.
9. Haile ZT, Oza-Frank R, Azulay Chertok IR, Passen N. Association between history of gestational diabetes and exclusive breastfeeding at hospital discharge. *J Hum Lact* 2016;32:NP36-43.
10. Shub A, Miranda M, Georgiou HM, McCarthy EA, Lappas M. The effect of breastfeeding on postpartum glucose tolerance and lipid profiles in women with gestational diabetes mellitus. *Int Breastfeed J* 2019;14:46.
11. Oza-Frank R, Chertok I, Bartley A. Differences in breast-feeding initiation and continuation by maternal diabetes status. *Public Health Nutr* 2015;18:727-35.
12. Nguyen PTH, Binns CW, Nguyen CL, Ha AVV, Chu TK, Duong DV, et al. Gestational diabetes mellitus reduces breastfeeding duration: A prospective cohort study. *Breastfeed Med* 2019;14:39-45.
13. Oza-Frank R, Moreland JJ, McNamara K, Geraghty SR, Keim SA. Early lactation and infant feeding practices differ by maternal gestational diabetes history. *J Hum Lact* 2016;32:658-65.
14. Laine MK, Kautiainen H, Gissler M, Pennanen P, Eriksson JG. Impact of gestational diabetes mellitus on the duration of breastfeeding in primiparous women: an observational cohort study. *Int Breastfeed J* 2021;16:19.
15. Gunderson EP, Hedderson MM, Chiang V, Crites Y, Walton D, Azevedo RA, et al. Lactation intensity and postpartum maternal glucose tolerance and insulin resistance in women with recent GDM: the SWIFT cohort. *Diabetes Care* 2012;35:50-6.
16. Gunderson EP, Hurston SR, Ning X, Lo JC, Crites Y, Walton D, et al. Lactation and progression to type 2 diabetes mellitus after gestational diabetes mellitus: A prospective cohort study. *Ann Intern Med* 2015;163:889-98.
17. Gunderson EP, Kim C, Quesenberry CP Jr, Marcovina

- S, Walton D, Azevedo RA, et al. Lactation intensity and fasting plasma lipids, lipoproteins, non-esterified free fatty acids, leptin and adiponectin in postpartum women with recent gestational diabetes mellitus: the SWIFT cohort. *Metabolism* 2014;63:941-50.
18. Ma J, Qiao Y, Zhao P, Li W, Katzmarzyk PT, Chaput JP, et al. Breastfeeding and childhood obesity: A 12-country study. *Matern Child Nutr* 2020;16:e12984.
 19. Carpenter MW, Coustan DR. Criteria for screening tests for gestational diabetes. *Am J Obstet Gynecol* 1982;144:768-73.
 20. Kajale NA, Chiplonkar SA, Khadilkar V, Khadilkar AV. Effect of breastfeeding practices and maternal nutrition on baby's weight gain during first 6 months. *J Obstet Gynaecol India* 2016;66:335-9.
 21. Dharel D, Dhungana R, Basnet S, Gautam S, Dhungana A, Dudani R, et al. Breastfeeding practices within the first six months of age in mid-western and eastern regions of Nepal: a health facility-based cross-sectional study. *BMC Pregnancy Childbirth* 2020;20:59.
 22. Zong XN, Li H, Zhang YQ, Wu HH. Growth performance comparison of exclusively breastfed infants with partially breastfed and formula fed infants. *PLoS One* 2020;15:e0237067.
 23. Youngwanichsetha S. Factors related to exclusive breastfeeding among postpartum Thai women with a history of gestational diabetes mellitus. *J Reprod Infant Psychol* 2013;31:208-17.
 24. Jirakittidul P, Panichyawat N, Chotrungrote B, Mala A. Prevalence and associated factors of breastfeeding in women with gestational diabetes in a University Hospital in Thailand. *Int Breastfeed J* 2019;14:34.
 25. Aris IM, Soh SE, Tint MT, Saw SM, Rajadurai VS, Godfrey KM, et al. Associations of infant milk feed type on early postnatal growth of offspring exposed and unexposed to gestational diabetes in utero. *Eur J Nutr* 2017;56:55-64.
 26. Wu JL, Pang SQ, Jiang XM, Zheng QX, Han XQ, Zhang XY, et al. Gestational diabetes mellitus and risk of delayed onset of lactogenesis: A systematic review and meta-analysis. *Breastfeed Med* 2021;16:385-92.