FACTORS ASSOCIATED WITH BREASTFEEDING INTENTION AMONG GESTATIONAL DIABETES MELLITUS MOTHERS

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Abstract

Breastfeeding knowledge, self-efficacy, attitude and breastfeeding intention affect breastfeeding rates, especially in mothers with Gestational Diabetes Mellitus (GDM) who are associated with having poor breastfeeding outcomes. Therefore, this study is aimed to investigate whether breastfeeding knowledge, attitude, self-efficacy, and sociodemographic factors are associated with breastfeeding intention among GDM pregnant mothers attending health clinics in Selangor. Validated questionnaires including Breastfeeding Self-Efficacy Scale Short Form (BSES-SF), Knowledge and Attitude, Breastfeeding Questionnaire (KA-BFQ), and Infant Feeding Intention (IFI) were self-administered to assess maternal knowledge, attitude, self-efficacy, and intention towards breastfeeding. Pearson's Chi Square and independent t-test were used to investigate factors associated with breastfeeding intention among GDM mothers. Multiple linear regression was executed to explore determinants of breastfeeding intention among the studied population. A total of 124 pregnant women with GDM visiting chosen public health clinics in Selangor were recruited for this study. Findings revealed the scores (Mean ± SD) for breastfeeding knowledge 25.66 ± 8.736, breastfeeding attitude 81 ± 11.5, and breastfeeding self-efficacy 48.5 ± 12. About 84.7% (n = 105) had the intention to breastfeed with a mean score of 11 ± 5.25. Further analysis depicted significant associations between breastfeeding intention with a family history of diabetes (AOR = 3.551, 95% CI: 1.127 to 11.185, *p*-value = 0.030) and breastfeeding knowledge (AOR = 1.107, 95% CI: 1.036 to 1.182, *p*-value = 0.003). This study concluded that mothers with GDM had fair breastfeeding knowledge, good attitude, high self-efficacy, and high intention in breastfeeding. These findings highlight the need to develop culture-specific interventions in improving breastfeeding knowledge particularly to enhance breastfeeding intention among GDM mothers.

Keywords: Exclusive Breastfeeding, Breastfeeding Intention, Breastfeeding Attitude, Breastfeeding Self-Efficacy, Gestational Diabetes Mellitus

Introduction

Breastfeeding is one of the important measures to neonates' health and provides essential nutrients, as recommended by World Health Organization (WHO) and United Nation Children's Fund (UNICEF) to protect both maternal and infants (1). Gestational Diabetes Mellitus or GDM is a type of diabetes that is diagnosed during pregnancy (2). GDM has great adverse impact on maternal and neonatal outcomes. Extensive studies shown both short and long-term benefits of breastfeeding on women with GDM and their offspring (3). Breastfeeding is associated with improved insulin sensitivity and glucose tolerance, enhance weight loss, and prevent occurrence of GDM and type II diabetes mellitus after delivery (4).

However, prevalence of GDM in Malaysia was high, approximately about 21.5% (5). Globally, highest prevalence of GDM was seen in Asia (South Asia 11.4%, East Asia 10.8%), while low rates were discovered in Australia with 3.6%, North America with 4.5% and North Europe with 6%

(6). In the meantime, the rates of breastfeeding practices are still low. The prevalence of infants aged below 6 months receiving exclusive breastfeeding, timely initiation, and continuous breastfeeding up to two years in Malaysia were 14.5% (CI: 11.7-17.9), 63.7% (CI: 61.4-65.9), and 37.4% (CI:32.9-42.2) respectively (7).

In Thailand, more than half (68.7%) GDM mothers expressed their intention to breastfeed for at least 6 months after delivery (8). Other countries like, Japan, and Saudia Arabia also reported a high prevalence of breastfeeding intention of 96% (9), and 95.9% (10) respectively. As in Malaysia, no studies were found on investigating breastfeeding intention among this population. However, regardless of the high determination to breastfeed during pregnancy, low breastfeeding rate of women in 4 weeks of postpartum was reported (11). In a meta-analysis that was conducted in 2020, infants born by GDM mothers had shorter duration of breastfeeding and lower rate of continued breastfeeding at twelve months (12). Mothers with GDM is known to have low breastfeeding rates as compared to their counterparts (12, 13) and earlier cessation of breastfeeding particularly during the first six months (14, 15). The low prevalence might be due to mothers facing difficulties to initiate and maintain breastfeeding (13). A systematic review has shown that there are three main factors influencing breastfeeding including maternal, social, and work-related factors (16). Mothers with GDM are more likely have to undergo for caesarean delivery due to obstetric complications they experienced which could hinder the early initiation of breastfeeding and therefore, could result to a shorter duration of exclusive breastfeeding and early cessation of breastfeeding (17). Evidence also suggested that maternal obesity which is closely related to GDM occurrence, was also associated with increased progesterone and decreased response to prolactin to infant suckling and could lead to breastfeeding difficulties such as insufficient breastmilk and early weaning (18). Lack of knowledge is also contributing factor of low rates in breastfeeding (19). On the other hand, higher breastfeeding knowledge is significantly linked to higher intention to breastfeed and greater breastfeeding confidence (20, 21). Therefore, the main objective of this study is to investigate the associations between sociodemographic characteristics, breastfeeding knowledge, attitude, self-efficacy, and intention among pregnant women with GDM.

Materials and Methods

Sample collection

This study used a cross-sectional study design to determine the factors associated with breastfeeding intention among expecting mothers with GDM attending Meru Health Clinics in Selangor. The data collection period began in the first week of April 2022 and lasted until the first week of July 2022. Data analysis, reporting, and documentation were conducted from July 2022 until the first week of August 2022. Ethical approval from Medical Research and Ethics Committee was obtained prior data collection period, NMRR-19-4204-52471 (IIR).

Sampling

A purposive sampling method was used to recruit GDM mothers attending the antenatal clinic at Meru Health Clinic. GDM women participated voluntarily in this study and agreed to anonymous data processing by completing the consent form before proceeding to the questionnaires. Participants were screened through their medical records. Some participants were approached face-to-face, and some were contacted by phone. Participants who agreed to participate signed informed consent. All participants were required to complete a survey in a hardcopy form or a Google link that consisted of the Breastfeeding Self-Efficacy Scale Short Form (BSES-SF), Knowledge and Attitude Breastfeeding Questionnaire (KA-BFQ), and Infant Feeding Intention (IFI) scale.

The calculated sample size was 310 participants by using the prevalence of GDM in Selangor. The prevalence of GDM in Selangor was 27.9% (8). Sample size calculation was calculated by the aid of online sample size calculator (16), the precision was set at 95% CI (two-tailed α-type 0.05 significance level).The inclusion criteria to participate in this study were literate Malaysian pregnant women aged 18-45 years, women who were diagnosed with GDM with ≥1 75g oral glucose tolerance test (OGTT) values exceeding established thresholds (fasting 5.1 mmol/l, 1 hour 10.0 mmol/l, 2 hours 8.5 mmol/l), received follow-up prenatal care at Meru health clinics in Selangor, have access to communication device and service. In contrast, the exclusion criteria were women unable to communicate in English or Bahasa Malaysia and women without cell phones.

Research instruments

Sociodemographic characteristics, breastfeeding self-efficacy, breastfeeding knowledge and attitude, and breastfeeding intention were measured by using Breastfeeding Self-Efficacy Scale Short Form (BSES-SF), Knowledge and Attitude Breastfeeding Questionnaire (KA-BFQ), and Infant Feeding Intention (IFI) scale. Sociodemographic domain was included in the questionnaire.

Breastfeeding Self-efficacy Scale Short Form (BSES-SF)

This questionnaire assessed breastfeeding confidence levels among participants in both groups This present study used a validated Breastfeeding Self-efficacy Scale Short Form (BSES-SF) that was translated into Malay language. The Cronbach's Alpha Value for Malay version was 0.94 (22). This instrument consists of 14-item self-administered questionnaire that measures breastfeeding confidence originated from 33-item BSES (23). These questions will be measured by using 5-point Likert-scales from "very confident", "confident", "sometimes confident". "not very

confident", to "not at all confident". Total scores range from 14 to 70, with higher scores reflecting more significant levels of breastfeeding self-efficacy. The scores were grouped into two categories, low and high breastfeeding self-efficacy. Scores lower than 42 were considered as low breastfeeding self-efficacy and vice versa.

Knowledge and Attitude Breastfeeding Questionnaire (KA-BFQ)

KA-BFQ indicates a mother's good knowledge and attitude that are needed towards successful breastfeeding. This validated instrument was to measure breastfeeding knowledge and attitude. The Cronbach's alpha of this questionnaire was 0.85 for knowledge and 0.79 for attitude (24). This questionnaire was divided into two sections: knowledge items, and attitude items. In the 47-item of knowledge domain, another 10 sub-domains were included containing the breastfeeding knowledge on advantages of breastfeeding to baby and mother, colostrum, effective feeding, breast milk expression, during of feeding, complementary feeding, problem with breastfeeding, breast engorgement and practical aspect of breastfeeding. These 10 sub-domains provided three answer choices: "true", "unsure", and "false". The participants will score "1" to every correct answer, and "0" for every incorrect answer. Breastfeeding knowledge score were categorised into three groups, Poor (<16), Fair (16-31), and Good (>31). To assess the attitude domain, the preliminary questions containing 23 items are divided into 3 sub-domains: cognitive, affective, and behavioural aspects of attitude. These questions were measured by using 5-point Likert-scales from "strongly agree", "agree", "unsure". "disagree", to "strongly disagree". The respondents will receive scores ranging from 1-5, 1 with most negative attitude and 5 with most positive attitude towards breastfeeding (18). breastfeeding attitude scores were categorised into two, Poor (<69) and Good (≥69) The sum of overall score for each domain—knowledge and attitude—were calculated.

Infant Feeding Intention (IFI) Scale

The Infant Feeding Intention was developed to measure maternal breastfeeding intentions quantitatively (25). This survey was then translated into Malay language and validated with Cronbach's Alpha of 0.791 (26). This questionnaire consists of 5 items, the strength of the intention to initiate breastfeeding measurements are included as the first two items. The remaining items will measure the strength of intention to provide infant with human milk as the sole source of milk at 1, 3, and 6 months of age. This assessment's total score was either 'yes' or 'no', expressing a very strong intent to exclusively breastfeed their children for the first six months of life.

Data analysis

In this study, IBM SPSS Version 26 and Microsoft Excel software were used for data organisation and data analysis. SPSS software was used to compute descriptive statistics and analyse sociodemographic data, breastfeeding self-efficacy, knowledge and attitude, and infant feeding intention of GDM women. Descriptive statistics of continuous variables for normally distributed data were presented in means and standard deviation, whereas skewed data were presented in median, and IQR (interquartile range). Categorical variables were in the form of frequencies and percentages. The level of significance of this study was set to two-tailed p-value < 0.05, with the power of 95%.

Pearson's Chi-square, Fisher's exact tests, and Independent T-tests were used to compare the proportion of the factors associated with breastfeeding intention among GDM mothers between women with and without the intention to breastfeed. Multiple binary logistic regression was used to identify the factors associated with breastfeeding intention among pregnant GDM mothers.

Results

Sociodemographic characteristics of the participants

Table 1 shows the participants' sociodemographic characteristics and their association with the number of women intents to breastfeed among pregnant GDM mothers. A total of 124 pregnant women with GDM were recruited at Meru Health Clinic The participants' age ranges from 20 to 43 years old and the mean age, 28.6 years old with a standard deviation of 4.7 years. All the participants were married, and the gestation week mean ± SD were 25.5 ± 7.0 weeks.

Most of the participants were 119 (96%) Malay, 118 (95.2%) were Muslims, 79 (63.7%) had completed tertiary education level, 80 (64.5%) were employed, 83 (66.9%) have income of ≤RM 2500, 93 (75%) had no history of GDM, 108 (87.1%) were not on insulin or medications for diabetes, 62 (50%) had family history of diabetes, were in more than or equal to 24 weeks of gestation (60.5%), first time pregnancy (75.8%), had no child (60.5%), had low household income of ≤ RM 4500 (72.6%), either lived with more than 2 household members (50%) or ≤ 2 household members (50%).

Breastfeeding intention

Data distribution analysis documented that more than half of the participants intend to breastfeed (84.7%, n = 105) (Table 1). All 105 participants with breastfeeding intention were mainly Malay (n = 101); 100 were Muslim, 69 had completed tertiary education, 67 were employed, 69 had ≤ RM 2500 income, 78 had no history of GDM, 91 were not prescribed insulin or medications for diabetes, 55 had no family history of diabetes, 77 were primigravida, 60 were nulliparous, 76 had ≤ RM 4500 of household income, and 56 lived with more than two household members. None of these sociodemographic characteristics was significantly associated to breastfeed their child (p>0.05).

Table 1: Sociodemographic characteristic of the participants and its associated with the number of women intent to breastfeed among pregnant GDM mothers (N = 124)

Variables	No intention to breastfeed, n = 19		Have intention to breastfeed, n = 105		Mean diff. (95% CI)[c]	t-stats (df)[c]	X^2 statistic (df)[a]	P-value
	Mean ± SD [Min – Max][c]	n (%)	Mean ± SD [Min – Max][c]	n (%)				
Age (years)	28.0 ± 5.2 [20 – 37]	19 (15.3)	28.7 ± 4.7 [21 – 43]	105 (84.7)	-0.7 (-3.0, 1.6)	-0.6 (122)	-	0.542[c]
Race							-	0.571[b]
Malay		18 (15.1)		101 (84.9)				
Non-Malay		1 (20)		4 (80)				
Religion							-	1.000[b]
Muslim		18 (15.3)		100 (84.7)				
non-Muslim		1 (16.7)		5 (83.3)				
Education level							1.191 (1)	0.275[a]
Secondary		9 (20)		36 (80)				
Tertiary		10 (12.7)		69 (66.9)				
Employment status							0.149 (1)	0.699[a]
Housewife		6 (13.6)		38 (86.4)				
Employed		13 (16.3)		67 (83.8)				
Maternal Income							0.462 (1)	0.497[a]
≤RM 2500)		14 (16.9)		69 (83.1)				
>RM 2500)		5 (12.2)		36 (87.8)				
GDM history							0.136 (1)	0.782[a]
Yes		4 (13.3)		26 (86.7)				
No		15 (16.1)		78 (83.9)				
Insulin/medications for diabetes							0.058 (1)	0.809[a]
Yes		2 (13.3)		13 (86.7)				
No		17 (15.7)		91 (84.3)				
Family history of diabetes							2.917 (1)	0.088[a]
Yes		13 (21)		49 (79)				
No		6 (9.8)		55 (90.2)				
Gestation week	22.4 ± 7.7 [13 – 36]	10 (20.4) 9 (12)	26.0 ± 6.7 [13 – 39]	39 (79.6) 66 (88)	-3.7 (-7.1, -0.3)	-2.1 (122)	-	0.034[c]
Gravida							-	0.157[b]
Primigravida		17 (18.1)		77 (81.9)				
Multigravida		2 (6.7)		28 (93.3)				
Parity							3.200 (1)	0.074[a]
Nulliparous		15 (20)		60 (80)				
Multiparous		4 (8.2)		45 (91.8)				
Household income							0.014 (1)	0.907[a]
≤RM 4500		14 (15.6)		76 (84.4)				
>RM 4500		5 (14.7)		29 (85.3)				
Household members							3.046 (1)	0.081[a]
≤2 household members		13 (21)		49 (79)				
>2 household members		6 (9.7)		56 (90.3)				

Note. Mean ± (SD) used to describe continuous normally distributed data, while Median (IQR) used to describe continuous non-normally distributed data. Categorical data described using frequency and percentage, n (%).

[a]Chi-square test for independence
[b]Fisher's exact test

[c]Independent t test

Breastfeeding knowledge

Table 2 shows participants' mean ± SD for breastfeeding knowledge score from KA-BFQ was 25.66 ± 8.736. Most (82.3%, n = 65) of the participants with fair knowledge scores (16-31) had the intention to breastfeed, and the remaining (17.7%, n = 14) had no intention to breastfeed. Participants with poor knowledge scores (< 16) mainly were (71.4%, n = 10) with breastfeeding intention and 28.6% (n = 4) without breastfeeding intention. Thirty participants (96.8%) scored good breastfeeding knowledge (> 31) and showed the intention to breastfeed, and 1 participant (3.2%) with a good breastfeeding knowledge score, however, had no intention to breastfeed. There was a significant association between breastfeeding knowledge and breastfeeding intention among participants with GDM

Table 2: Breastfeeding intention according to breastfeeding knowledge, attitude, and self-efficacy (N = 124)

Variables	Mean ± SD	No intention to breastfeed, n = 19 n (%)	Have intention to breastfeed, n = 105 n (%)	X² statistic (df)[a]	P-value
KA-BFQ scores	25.66 ±				
Breastfeeding knowledge	8.736			-	0.039[b]
Poor (<16)		4 (28.6)	10 (71.4)		
Fair (16 – 31)		14 (17.7)	65 (82.3)		
Good (>31)		1 (3.2)	30 (96.8)		
Breastfeeding attitude	81 ± 11.5			-	1.000[b]
Poor (<69)		0 (0)	4 (100)		
Good (≥69)		19 (15.8)	101 (84.2)		
BSES-SF scores					
Breastfeeding self-efficacy	48.5 ± 12			-	0.135[b]
Low (<42)		7 (25)	21 (75)		
High (≥42)		12 (12.5)	84 (87.5)		

Note. Mean ± (SD) used to describe continuous normally distributed data

[a]Chi-square test for independence

[b]Fisher's exact test

Breastfeeding attitude

The attitude towards breastfeeding had a mean score ± SD of 81 ± 11.5, reflecting a good breastfeeding attitude (≥ 69). Most participants (84.2%, n = 101) with good breastfeeding attitudes had breastfeeding intentions, while 19 participants (15.8%) did not intend to breastfeed. None of the participants without breastfeeding intention scored less than 69, but 4 participants (100%) with the intention to breastfeed all scored poorly (Table 2).

Breastfeeding self-efficacy

The breastfeeding self-efficacy mean ± SD score from BSES-SF was 48.5 ± 12 and approximately had high breastfeeding self-efficacy (≥ 42). Most participants (87.5%, n = 84) who scored high for breastfeeding self-efficacy had the intention to breastfeed, and about 12.5% (n = 12) had no intention to breastfeed. Low breastfeeding self-efficacy score (< 42) was more prevalent in participants with breastfeeding intention (75%, n = 21) than those without breastfeeding intention (25%, n = 7).

Multivariate logistic regression analysis of factors associated with breastfeeding intention

Before conducting a multivariate binary logistic regression test, breastfeeding knowledge, attitude, and self-efficacy scores were converted back into the continuous variable. Therefore, a multivariate binary logistic regression test was performed with continuous and categorical variables. Bivariate binary logistic regression analyses found a significant association between maternal intention to breastfeed with a family history of diabetes, gestation week, and breastfeeding knowledge ($p < 0.05$). All the relevant variables found significant in bivariate analyses were further analysed in multivariate binary logistic regression to determine the association with breastfeeding intention. Table 3 shows a multivariate binary logistic regression model of the factors associated with breastfeeding intention among GDM pregnant mothers with the adjusted odds ratio. Breastfeeding knowledge and family history of diabetes remained significant after the analysis (p-value < 0.05).

Table 3: Multivariate logistic regression analysis of factors associated with breastfeeding intention (N = 124)

Variables	Unadjusted		Adjusted		
	OR (95% CI)	P-value	B	OR (95% CI)	P-value
Age (years)	1.035 (0.928, 1.153)	0.539			
Race					
Malay	1				
non-Malay	0.713 (0.075, 6.750)	0.768			
Religion					
Muslim	1				
non-Muslim	0.900 (0.099, 8.162)	0.925			
Education level					
Secondary	1				
Tertiary	1.725 (0.643, 4.627)	0.279			
Employment status					
Housewife	1				
Employed	0.814 (0.286, 2.316)	0.699			
Income					
≤RM 2500	1				
>RM 2500	1.461 (0.487, 4.379)	0.499			

Variables	Unadjusted		Adjusted		
	OR (95% CI)	P-value	B	OR (95% CI)	P-value
GDM history					
Yes	1				
No	0.800 (0.244, 2.627)	0.713			
Insulin/ medications for diabetes					
Yes	1				
No	0.824 (0.170, 3.983)	0.809			
Family history of diabetes			1.267	3.551 (1.127, 11.185)	0.030[b]
Yes	1				
No	2.432 (0.859, 6.888)	0.094[a]			
Gestation week	1.082 (1.004, 1.167)	0.001[a]			
Gravida					
Primigravida	1				
Multigravida	3.091 (0.671, 14.241)	0.148[a]			
Parity					
Nulliparous	1				
Multiparous	2.812 (0.874, 9.050)	0.083[a]			
Household income					
Low (≤RM 4500)	1				
High (>RM 4500)	1.068 (0.353, 3.233)	0.907			
Household members					
≤2 household members	1				
>2 household members	2.476 (0.875, 7.010)	0.088[a]			
KA-BFQ scores					
Breastfeeding knowledge	1.084 (1.021, 1.150)	0.008[a]	0.101	1.107 (1.036, 1.182)	0.003[b]
Breastfeeding attitude	0.995 (0.949, 1.043)	0.837			
BSES-SF scores					
Breastfeeding self-efficacy	1.034 (0.989, 1.081)	0.144[a]			

Constant = -1.222

No multicollinearity and no interaction

Hosmer Lemeshow test, *p*-value = 0.506

Classification table 85.4% correctly classified

Area under Receiver Operating Characteristics (ROC) curve was 74%

[a]*p*-value<0.25

[b]*p*-value<0.05

In this study, family history of diabetes and breastfeeding knowledge was significantly associated with breastfeeding intention (AOR = 3.551, 95% CI: 1.127 to 11.185, *p*-value = 0.030) and (AOR = 1.107, 95% CI: 1.036 to 1.182, *p*-value = 0.003) respectively. Pregnant GDM mothers were more likely to have breastfeeding intention if they did not have a family history of diabetes. Women without a family history of diabetes have 3.551 times higher odds than women with a family history of diabetes to have the intention to breastfeed (95% CI: 1.127 to 11.185, *p*-value = 0.030) when adjusted with breastfeeding knowledge. Pregnant GDM mothers were more likely to have breastfeeding intention if they did not have a family history of diabetes. A woman with 1 score higher in breastfeeding knowledge has 1.107 times the odds of having breastfeeding intention (95% CI: 1.036 to 1.182, *p*-value = 0.003) when adjusted for the presence of a family history of diabetes. The expecting mothers in this study had a good attitude towards breastfeeding, but it was not significantly associated with breastfeeding intention (p=0.837). In this study, the BSES-SF median (IQR) score was 48.5 (12), which indicated good breastfeeding self-efficacy, but the multiple binary regression model revealed no significant association with breastfeeding intention (*p*-value = 0.144). This study, however, did not find a significant association (p > 0.05) between breastfeeding intention and maternal age, race, religion, educational level, employment status, maternal income, GDM history, usage of insulin or medications for diabetes, gestation week, gravida, parity, household income, and household members.

Discussion

It is widely believed that breastfeeding intention strongly predicts a mother's breastfeeding practices and outcome. In our study, there were two significant factors that showed an association with breastfeeding intention which were breastfeeding knowledge and no family history of DM (p < 0.05). Our study documented majority (85%, n = 105) of the participants intended to breastfeed their infants. According to a recent report in Thailand, maternal intention to exclusively breastfeed (EBF) for 6 months was an independent predictor for breastfeeding. However, they reported that most (94.3%) participants could only exclusively breastfeed their infants for the first 6 weeks postnatal (8). Countries like China, and Saudia Arabia also reported a high prevalence of breastfeeding intention of 99.1% (9) and 95.9% (10), respectively. Regardless of the high determination to breastfeed during the pregnancy stage, less than half (46%) breastfeeding rate of women in 4 weeks of postpartum (9). Although the prevalence of EBF is still lower than the global target, maternal breastfeeding intention and initiation remained essential factors associated with six months of exclusive breastfeeding (8).

It is important to note that this finding documented that breastfeeding intention did not influence by employment status. Findings by Ihudiebube-Splendor and colleagues also parallel to this study, where employment status was not associated with breastfeeding intention (27). However, previous studies did find a significant association between breastfeeding intention with age (27, 28) and educational level (27). Ihudiebube-Splendor and colleagues inferred that women with higher education levels were more likely to act on healthcare workers' suggestions (27).

A family history of diabetes was significantly associated with breastfeeding intention (AOR = 3.551, 95% CI: 1.127 to 11.185, *p*-value = 0.030). Pregnant GDM mothers were more likely to have breastfeeding intention if they did not have a family history of diabetes. In contrast with earlier findings, more than half of the participants with a family history of DM intended to breastfeed their infants (30). In contrast, Kim et al. (2020) documented that a family history of diabetes did not influence maternal intention to breastfeed (31). The reason why the findings were not consistent might be affected by the number of subjects, as the study conducted in Bangladesh represented the highest number of participants among others (31). Postnatal support can effectively improve breastfeeding intention and increase breastfeeding rates regardless of the family history of DM (29). One study reported that spouses of women with GDM favoured formula feeding or mixed feeding more than breastfeeding, and the women in that study were less likely to breastfeed their infants (29).

Another crucial finding from this study reported a significant association between breastfeeding knowledge and breastfeeding intention (AOR = 1.107, 95% CI: 1.036 to 1.182, *p*-value = 0.003). Previous studies showed similar findings of breastfeeding knowledge as the predictor of breastfeeding practices (27, 28, 32). Services provided by health clinics attended by these expecting mothers might have influenced the level of breastfeeding knowledge (27, 29, 32). It either increases the awareness and knowledge of the benefits of breastfeeding during the antenatal appointment (32) or not receiving enough despite routine follow-ups due to inaccessibility to any prenatal services, such as being unable to attend the sharing session (28). The mean (SD) breastfeeding score of the participants was remarkably moderate, 25.66 (8.736), since most of them (75.8%) were primigravida women. The association probability of low breastfeeding knowledge might be due to being a mother for the first time being a foreign experience and having never seen other mothers breastfeeding exclusively in the past (27). Breastfeeding education can increase breastfeeding intention among pregnant mothers (28). A nine-minute breastfeeding education video module resulted in 80.8% of expecting mothers intending to breastfeed (28). Like other studies, individualised breastfeeding education significantly increased breastfeeding knowledge (33) and the breastfeeding rate (9, 34).

Nevertheless, a cross-sectional study in Malaysia revealed that although women with GDM had good breastfeeding knowledge, breastfeeding practices and attitudes were still sub-optimal (35). Generally, mothers with GDM had lack of reliable sources of information. They consider GDM as a minor illness during pregnancy and do not realize the long-term risk of GDM and the protective effects of breastfeeding on themselves and their infants (36). This situation is a strong indicator for future research to initiate an early T2DM prevention strategy by refocusing efforts to support optimal lactation intensity and duration and implementing dietary modification.

The expecting mothers in this study had a good attitude towards breastfeeding, but it was not significantly associated with breastfeeding intention (p = 0.837). Maternal parity might have influenced breastfeeding attitudes considering 75.8% of them (primigravida) had no actual breastfeeding experience. This finding agrees with a study in Saudi Arabia by Alnasser et al. (28); there was no significant association between attitude towards breastfeeding and breastfeeding intention. Only 46.1% of Saudi Arabia expecting mothers intended to breastfeed exclusively. A majority had poor attitudes towards breastfeeding because they were uncomfortable with breastfeeding in front of other people except for their husbands.

Breastfeeding self-efficacy is defined as maternal confidence in breastfeeding (37). Current study showed the BSES-SF median (IQR) score was 48.5 (31), which indicates good breastfeeding self-efficacy, and the multiple binary regression model showed no significant association with breastfeeding intention (*p*-value = 0.144). 62.9% of the participants expressed low confidence in ensuring the infant only receives breastmilk without additional formula. More than half (55.6%) of the participants felt uncomfortable breastfeeding in front of their family members. Low breastfeeding self-efficacy in this study might reflect uncertainty in breastfeeding, especially among women who had low satisfaction (53.2%) with their experience towards breastfeeding. Participants' moderate breastfeeding knowledge might indicate a shallow understanding regarding the benefit and proper techniques of breastfeeding, which as a result, may be insufficient to convince these mothers to have more confidence in breastfeeding.

There were limitations to this study. The total calculated sample size according to GDM prevalence in Selangor was 310 participants. However, this study able to recruit respondents from Klinik Kesihatan Meru only, due to lack of permitted access from other health clinics, time constraint and limited participation during data collection period, therefore, this study may not be able to represent Selangor population. Despite its limitations, the study certainly adds to our understanding that breastfeeding knowledge and no family history of DM significantly associated with breastfeeding intention of women with GDM in Selangor, Malaysia. Indeed, future studies should include more participants to explore more factors related to breastfeeding intention, which could eventually improve the breastfeeding rate among women with GDM.

Conclusion

This study aimed to determine the factors associated with breastfeeding intention among pregnant mother with GDM attending health clinics in Selangor. This study concluded that pregnant mothers with GDM had fair breastfeeding knowledge, positive attitude in breastfeeding, higher confidence, and intention to breastfeed. These findings highlight the need to develop culture-specific interventions

in improving breastfeeding knowledge particularly to enhance breastfeeding intention among GDM mothers.

Acknowledgement

Competing interests

The authors have no conflict of interest in this study.

Ethical clearance

Ethical approval from Medical Research and Ethics Committee, Ministry of Health was obtained prior data collection period, NMRR-19-4204-52471 (IIR).

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