

## ORIGINAL ARTICLE

# Comparison of Knowledge, Attitude, and Practices on Breastfeeding Between Women With and Without Gestational Diabetes Mellitus in Malaysia: A Cross-sectional Study

Farhanah Ahmad Shuhaimi<sup>1</sup>, Syahrul Bariah Abdul Hamid<sup>1,2</sup>, Norhaslinda Othman<sup>1</sup>

<sup>1</sup> Centre for Dietetics Studies, Faculty of Health Sciences, UiTM Selangor Puncak Alam, 42300 Puncak Alam, Selangor Darul Ehsan, Malaysia

<sup>2</sup> Mother, Infant & Young Child Nutrition (MiChild) Research Group, Faculty of Medicine and Health Sciences, UiTM Puncak Alam, 42300 Puncak Alam, Selangor Darul Ehsan.

## ABSTRACT

**Introduction:** Breastfeeding has been shown to assist in lowering postnatal blood sugar; hence breastfeeding is critical for women who have gestational diabetes mellitus (GDM). This study compares breastfeeding knowledge, attitude, and practices between women with non GDM (NGDM) and GDM and its association with GDM status.

**Methods:** A cross-sectional online survey was conducted among mothers with a healthy child below two years old. A breastfeeding knowledge, attitude, and practices (KAP) questionnaire was used to assess the level of KAP of the participants. Point Biserial correlation was used to analyze the association between the KAP scores and GDM status.

**Results:** Three hundred twenty-one mothers were recruited, with 160 of them having normal pregnancies and 161 having a history of GDM. A majority (n=241, 75%) of the participants exclusively breastfeed their children for 6 months. Both groups scored good in breastfeeding knowledge,  $10.3 \pm 1.4$ . However, they scored fair practices and attitude  $4.1 \pm 1.2$ ,  $4.3 \pm 1.3$ , respectively. Among the participants, only 39.25% (n=126) attended breastfeeding classes before delivery; 40% (n=64) were NGDM and 38.5% (n=62) were GDM. Women with GDM scored better in breastfeeding knowledge and attitude ( $r=0.025$ ,  $p=.0.656$ ) ( $r=0.052$ ,  $p=0.352$ ). Meanwhile, women without GDM were less likely to practice breastfeeding than women with GDM ( $r=-0.35$ ,  $p=.536$ ). Despite the differences, the association was not statistically significant. **Conclusion:** This study revealed a worrying fact that participants' attitudes and practices were still at a sub-optimal level, despite having good breastfeeding knowledge. Therefore, it is imperative to design future interventions and research targeting particular aspects influencing breastfeeding practices.

*Malaysian Journal of Medicine and Health Sciences* (2022) 18(8):333-339. doi:10.47836/mjmhs18.8.42

**Keywords:** Gestational diabetes mellitus, Breastfeeding, Knowledge, Attitude, Practices.

## Corresponding Author:

Syahrul Bariah Abdul Hamid, PhD  
Email: syahrulbariah@uitm.edu.my  
Tel: +603- 3258 4510

## INTRODUCTION

Breastmilk provides all the nutrients needed for infant growth, starting from the first day of life until the next six months (1). Thus, mothers are highly recommended to exclusively breastfeed (EBF) their infants for up to 6 months. Breastfeeding has been shown to protect infants from various infections, celiac diseases, inflammatory bowel diseases, leukaemia, necrotizing enterocolitis, and cardiovascular diseases (2).

Additionally, it has been well documented that breastfeeding offers vast benefits to mothers. Centres for Disease Control and Prevention (CDC) has documented that breastfeeding can reduce maternal risk of breast and ovarian cancer, diabetes and hypertension (3). During breastfeeding, the mother's body will produce prolactin that will stimulate insulin secretion from beta cells and produce serotonin. This hormone is an antioxidant and helps to reduce oxidative stress, making the mother's beta-pancreatic cells healthier (4). The protective effects of breastfeeding against the development of postnatal diabetes among women with gestational diabetes mellitus (GDM) are often overlooked.

According to a study in Washington(5), longer breastfeeding duration was inversely associated with the

risk of developing diabetes after delivery. Despite many advantages of breastfeeding, the rate of breastfeeding in Malaysia is not optimal (6). Surprisingly, mothers with GDM were less likely to exclusively breastfeed (EBF) their infants, and they may have a shorter breastfeeding duration than mothers with normal pregnancies (7). Women with GDM who are obese and overweight have delayed lactogenesis, increasing the chances of formula milk use (8). Women with GDM were less likely to breastfeed their children as they were prone to have adverse pregnancy outcomes like caesarean section, premature delivery, macrosomia, neonatal hypoglycemia, and premature rupture membranes, which reduce early lactation initiation (9). The breastfeeding rate among women with GDM was often lower than women W/GDM, possibly associated with many breastfeeding initiation challenges that may affect breastfeeding practices. One study has documented that women with GDM initiated breastfeeding as often as women without GDM but were more likely to start formula feeding their child as early as day 2 of life even though there was no difference reported in breastfeeding difficulty between both groups(10).

Women with GDM had less favourable breastfeeding attitudes and beliefs, and they perceived obtaining less breastfeeding support from their spouses and physicians (11). It is believed that women with GDM may be less likely to breastfeed their child than women N/GDM, but little is known about the association between the knowledge, attitude, and belief on breastfeeding that influence this disparity. Thus, this study was aimed to compare the knowledge, attitude, and practices of breastfeeding women with and without GDM and its association with GDM status.

## MATERIALS AND METHODS

### Study sample

A cross-sectional study was conducted to compare the knowledge, attitude, and practices on breastfeeding among women with and without a history of GDM. Data collection was conducted from June to December 2020. The study was conducted through an online survey on Malaysian Facebook Support Groups comprising a sample population of women with and without a history of GDM. A search was performed on Facebook, from which any group consisting of more than 1000 participants were selected to share the questionnaire. The participants who joined this study were healthy women aged  $\geq 20$  years, able to understand and communicate in the Malay language, and with a healthy child aged  $< 2$  years. In contrast, the exclusion criteria were mothers with severe pre-existing health conditions and children with a congenital disease that led to the inability to receive breastmilk naturally. Before answering the survey, all participants were asked a few questions through 'Google Forms'. This was to

ensure their eligibility and obtain their declaration for participating in this study. The questionnaire consists of four sections, including socio-demographic data, breastfeeding knowledge, attitude and practices. This study was approved by the UiTM Research Ethics Committee (with an approval code: REC/12/2020) (UG/MR/237)).

### Sample Size Determination

The convenience sampling method was applied, and the study was conducted through a web 'Google Forms' survey. The total population in the study was 20 000 subjects, calculated using the Raosoft software. According to Raosoft Inc., 20 000 is the upper limit for an exact unknown total population. The sample size of this study was 321 participants consisting of women with a history of GDM and non-GDM women. The Raosoft software was also used to calculate the respondents with a confidence interval of 90% and a margin error of 5%. However, 20% of the sample size was considered to compensate for any dropout from the research. The respondents were divided into two groups: GDM and non-GDM. There were 161 respondents randomly chosen from the Malaysian Facebook Breastfeeding Support Groups.

### Research instrument

This study used a validated knowledge, attitude, and practices (KAP) questionnaire adapted from a study done in Dubai (12). It contained 30 questions in four sections. The questions addressed the participant's socio-demographic data, breastfeeding knowledge, attitude toward breastfeeding, and breastfeeding practices. The questions were intended to assess participants' breastfeeding knowledge using twelve questions about the frequency and duration of breastfeeding, the importance of colostrum, exclusive breastfeeding, and the child's age of introducing complementary food.

The next section of the questionnaire contained six questions that assessed attitudes towards breastfeeding. This section focused on the physical changes due to breastfeeding, the intention to breastfeed the next child, and the intention to join breastfeeding classes in the future. The last section of the questionnaire consisted of six questions that assessed breastfeeding practices. It covered breastfeeding initiation after delivery, duration of breastfeeding the previous child, practice of exclusive breastfeeding, planning on EBF for the next baby, and breastfeeding class attendance. For each question, subjects were provided three answer choices: Yes, No, and I don't know. One mark was given for "Yes"; meanwhile, 0 scores were given for "No" and "I don't know". Scores were totalled up according to each variable. The scoring system was as follows: Knowledge: Good (8-12 points), fair (4-7 points), poor (0-2 points); Attitude: Good (5-6 points), fair (3-4 points), poor (0-2 points); Practice: Good (5-6 points), fair (3-4 points), poor (0-2 point).

## Data analysis

Collected data were analyzed using the Statistical Package for Social Sciences software version 25 (SPSS Inc. Chicago, USA). Descriptive analysis of continuous data was presented as mean and standard deviation (SD). Meanwhile, categorical data were presented in percentages. An independent t-test was used to compare the scores between the two groups. Point Biserial correlation was conducted to determine the association between GDM status and KAP scores. Analyzed data with a p-value of less than 0.05 was considered statistically significant.

## RESULT

A total of 453 participants were recruited for this survey. However, only 321 participants completed the study. One hundred thirty-two participants were excluded as 56 participants did not meet the inclusion criteria, whereas 76 participants had an incomplete submission. The socio-demographic and socio-economic backgrounds of the participants are presented in Table I. The mean age for all participants was  $29.43 \pm 4.1$  years. The majority of the participants were Malay (95.6%, n=307), followed by the other ethnicities (3.1%, n=10), Indian (0.6%, n=2), and Chinese (0.6%, n=2). The participants were grouped into their status of GDM; 160 (49.8%) participants were in the NGDM group, and another 161 (50.2%) participants were in the GDM group.

**Table I Socio-Demographic and Socio-Economic Background of Participants (N=321)**

	Total (N=321) n (%)	NGDM (n=160)	GDM (n=161)
Age (years)	$29.43 \pm 4.1$	$28.84 \pm 4.2$	$30.01 \pm 3.9$
Ethnicity			
Malay	307 (95.6)	153	154
Chinese	2(0.6)	1	1
Indian	2(0.6)	2	0
*Others	10 (3.1)	4	6
Education level			
Secondary school	51 (15.9)	27	24
Tertiary education	270 (84.1)	133	137
Occupation			
Government and private employed	165 (51.4)	81	84
Self-employed	53 (16.5)	25	28
Unemployed	103 (32.1)	54	49
Marital status			
Married	320 (99.7)	160	160
Widowed	1 (0.3)	0	1
Monthly household income			
>RM 6000	61(19)	26	35
RM 3000 – RM 6000	114 (35.5)	59	55
RM 1000- RM 3000	133 (41.4)	68	65
RM 900 – RM 1000	9 (2.8)	5	4
<RM 900	4 (1.2)	2	2

\*NGDM= Women without GDM, GDM=Women with GDM

\* refers to Dusun, Chinese, Bidayuh, Sino-Kadazan, Bajau, Kadazan, Rungus, or Sino ethnicity

The education level of both groups was homogenous. A majority (84.1%, n=270) of the participants received tertiary education. More than half of the participants (51.4%, n=165) were government and private-sector workers. Thirty-two percent of them were unemployed, while the remaining (16.5%, n=53) were self-employed. Based on household income, the socio-economic status was comparable between both groups. The participants' household income mainly ranged from RM 1000 to RM 3000 (41.4%, n=133), followed by RM 3000 to RM6000 (35.5%, n=114), 19% (n=61) had more than RM 6000, and 1.2% (n=4) less than RM900, respectively. One hundred-eighty-six of the participants had one child. Two percent of the participants were smokers before they were pregnant. Regardless of GDM status, more than half of the participants in both groups (NGDM; n=91, 56.9%, GDM; n=91, 56.5%) did not attend breastfeeding classes during their antenatal check-ups. Table II shows the maternal characteristics of the participants. More participants (N=186) from both groups were having their first child. While the majority (N=315) of the participants were non-smokers before they conceived. It is important to note that a total of 193 participants of all participants did not attend breastfeeding classes during their pregnancy.

**Table II Maternal Characteristics of Participants (N=321)**

	Total (N=321)	NGDM (N=160)	GDM (N=161)
Number of Children			
Uniparous	186	94	92
Multiparous	135	66	69
Smoking status			
Yes (before pregnancy)	6	4	2
No	315	156	159
Attended breastfeeding class			
Yes	126	64	62
No	193	95	98

\*NGDM= Women without GDM, GDM=Women with GDM

Table III documents the score of knowledge, attitude, and practices on breastfeeding among participants. The Independent t-test showed no significant differences in scoring on both groups' knowledge, attitude, and practices. NGDM and GDM groups scored good in breastfeeding knowledge ( $10.3 \pm 1.4$  vs  $10.37 \pm 1.4$ ), respectively. However, NGDM and GDM had fair scores ( $4.2 \pm 1.2$  vs  $4.4 \pm 1.4$ ) in breastfeeding attitude

**Table III The mean score of Knowledge, Attitude, and Practices on breastfeeding among NGDM and GDM (N=321)**

Variables	Total (N=321)	NGDM (N=160)	GDM (N=161)	p-value
Knowledge	10.3±1.4	10.3 ±1.4	10.37±1.4	0.579
Attitude	4.3±1.3	4.2±1.2	4.4±1.4	0.621
Practices	4.1±1.2	4.1±1.1	4.1±1.2	0.588

\*NGDM= Women without GDM, GDM=Women with GDM

(4.1±1.1 vs 4.1±1.2) and practices, respectively. They were aware that babies need to be breastfed as frequently as possible upon the child's demand. Participants knew that colostrum is good for babies, and they knew that breastmilk is the optimal nutrient source for babies for the first six months of life (refer to Table IV).

More participants (94.4%, n=115) in NGDM believed that breastfeeding could not increase a mother's weight than in GDM (73.3%, n=118). More than 90% (n=304)

**Table IV Knowledge, attitude, and practices of participants towards breastfeeding (N=321)**

Variables	Yes		No		I Don't Know	
	NGDM n=160 n (%)	GDM n=161 n (%)	NGDM n=160 n (%)	GDM n=161 n (%)	NGDM n=160 n (%)	GDM n=161 n (%)
<b>Knowledge</b>						
1. Breastfeeding child ≥8 times/day during the first month	149 (93)	141 (87.6)	8 (5)	15 (9.3)	3 (2)	8 (4.9)
2. Breastfeeding duration ≥15 min from each breast during the first month	139 (86.8)	139 (86.3)	17 (10.6)	14 (8.7)	4 (2.5)	8 (5)
3. Colostrum is good for the child	151 (94.4)	157 (97.5)	1 (0.6)	1 (0.6)	8 (5)	3(18.7)
4. Breastfeeding is beneficial for both the mother and the child	159 (98)	159 (98.8)	0 (0)	1 (0.6)	1 (2)	1 (0.6)
5. Children should receive breast milk until ≥24 months of age	149 (93)	153 (95)	7 (4.3)	7 (4.3)	4 (2.5)	1 (0.6)
6. Complementary food should be introduced at 6 months of age	158 (98.7)	160 (99.3)	0 (0)	1 (0.6)	2 (1.3)	0 (0)
7. Breast milk is superior to formula milk in fulfilling a child's necessary dietary requirements	158 (98.7)	157 (97.5)	1 (0.6)	2 (1.2)	1 (0.6)	2 (1.2)
8. Breast milk is sufficient for a child in the first 6 months of life	152 (95)	153 (95)	4 (2.5)	6 (3.7)	4 (2.5)	2 (1.2)
<b>Attitude</b>						
9. Breastfeeding cannot increase the mother's weight	115 (94.4)	118 (73.3)	23 (14.3)	25 (15.5)	22 (13.8)	18 (11.2)
10. One of the causes of hair loss is breastfeeding	36 (22.5)	31 (19.3)	77 (48)	91 (56.5)	47 (29.4)	39 (24.2)
11. Pumping breast milk is still beneficial for the child	152 (95)	152 (94.4)	2 (3.3)	2 (1.2)	6 (3.75)	7 (4.3)
12. Mothers should not stop breastfeeding if they take any type of medication	93 (57.7)	90 (56)	41 (2.5)	44 (27.3)	26 (16.3)	27 (16.8)
13. Intention to breastfeed future children	152 (95)	156 (96.9)	6 (3.75)	4 (2.5)	2 (3.3)	1 (0.6)
14. Plan to attend breastfeeding classes in a future pregnancy	98 (61.3)	96 (59.6)	48 (30)	47 (29.2)	14 (8.8)	18 (11.2)
<b>Practices</b>						
15. Initiation of breastfeeding immediately and within the first hour of life	144 (90)	134 (83.2)	7 (4.4)	16 (9.9)	9 (5.6)	11 (6.8)
16. Currently breastfeeding the last child and intending to continue until the age of ≥24 months	137 (85.6)	148 (91.9)	17 (10.6)	12 (7.5)	6 (3.75)	1 (0.6)
17. Exclusively breastfed the last child for 6 months	125 (78.1)	116 (72)	25 (15.6)	38 (23.6)	10 (6.25)	7 (4.3)
18. Planning to continue exclusively breastfeeding the last child until 6 months of age	132 (82.5)	126 (78.3)	23 (38.3)	32 (19.9)	5 (3.1)	3 (1.9)
19. Child was not given ready-made liquid formula in the hospital	62 (38.8)	69 (42.9)	86 (53.8)	79 (49)	12 (7.5)	13 (8.1)
20. Attended breastfeeding classes during pregnancy	64 (40)	62 (38.5)	91 (56.9)	91 (56.5)	5 (3.1)	8 (5)

\*NGDM= Women without GDM, GDM=Women with GDM

of the participants in both groups knew that pumping breastmilk is still beneficial for their children. Almost all participants from both groups intended to breastfeed their future child. However, only half of them planned to attend breastfeeding classes in future pregnancies. Participants who believed that they didn't need to stop breastfeeding on medication were 57.7% (n=93) for the NGDM group and 56% (n=90) for the GDM group.

The final section of the questionnaire assessed the breastfeeding practice of the participants. Participants were asked about breastfeeding initiation within the first hour of their infant's life. More NGDM (90%, n=144) initiated breastfeeding immediately after delivery. A majority (91.9%, n=148) of GDM currently breastfeed their child and intend to continue breastfeeding for up to 2 years. More than half, 78.1% (n=125) and 72% (n=116) of NGDM and GDM, respectively, had practised EBF for their last child. More than half (73.7%, n=241) of the participants exclusively breastfeed their children regardless of their GDM status. It is important to note that the data only documented that 40% (n=64) and 38.5% (n=62) of NGDM and GDM, respectively, had attended breastfeeding classes during pregnancy. More than half of the participants (56.6%, n=182) from both groups did not participate in breastfeeding classes during their antenatal check-ups.

The result of correlational analysis between knowledge, attitude, and practices scores of participants with and without a history of GDM are shown in Table V. GDM appeared to have a better score in the association with breastfeeding knowledge (r=0.025, p=.0.656) and attitude (r=0.052, p=0.352). The breastfeeding practices among GDM were slightly poor (r=-0.35, p=.536). However, the result of this association was not statistically significant.

**Table V The correlation between knowledge, attitude, and practices scoring with Gestational Diabetes Mellitus Status (N=321)**

Variables	GDM STATUS	
	Point Biserial-correlation	p-value
Knowledge	0.025	0.656
Attitude	0.052	0.352
Practice	-0.35	0.536

\*Correlation is significant at 0.05 (2-tailed)

## DISCUSSION

The findings of this study were about to compare the breastfeeding knowledge, attitude and practices among women with NGDM and with GDM. No other studies have observed breastfeeding KAP by GDM history in Malaysia. Our data showed that participants' education level in both groups was homogenous. The majority (84%) of the subjects had a tertiary education level. This study documented all participants had a good level of knowledge on breastfeeding regardless of their

GDM status, with no significant difference between groups (p=0.579). Breastfeeding education, strategies and promotion have always been an essential aspect of infant and children nutrition in Malaysia since the 1970s. Numerous governmental efforts include breastfeeding counselling courses for health professionals, breastfeeding curriculum for primary and secondary school children, initiation of baby-friendly hospitals that support the establishment of breastfeeding, and breastfeeding classes during antenatal follow-ups (13). Therefore, the present findings seem consistent with the government's initiatives in conveying breastfeeding knowledge to Malaysian women.

In this study, women with GDM scored slightly better (10.37±1.4) than GDM (10.3 ±1.4). However, the score was statistically insignificant. It is encouraging to compare the breastfeeding knowledge score with a previous study that showed breastfeeding knowledge among women with GDM were similar to that of women with normal pregnancy (14). According to a previous study in China, breastfeeding knowledge were independently related to gestational age, education level, household income and knowledge source. The study also stated that women's education level had the most significant influence on breastfeeding knowledge (15). Consistent with the education level of the participants of this study, the majority of them had a tertiary education level that reflects a good level of breastfeeding knowledge. It is also encouraging to compare the breastfeeding knowledge score of Malaysian women in 2019 with the current study(16). Half of the respondents in the study had good to excellent knowledge of EBF back then. Recent findings suggested that more Malaysian women seemed to have good to excellent breastfeeding knowledge over a few years.

Surprisingly, good breastfeeding knowledge was not sufficient to ensure a higher rate of EBF. This study has shown that the majority (95%) of women in both groups knew that babies needed EBF for the first six months of life. However, only 78.1% of women without GDM and 72% of women with GDM had EBF their children. In contrast to earlier findings, poor understanding and lack of knowledge on breastfeeding led to lower breastfeeding intention among women with GDM in Bangladesh (17). We hypothesized that women in this study with good breastfeeding knowledge do not guarantee a high breastfeeding rate.

In Malaysia, the rate of EBF in 2016 was 47.1% (18), which is far below the global breastfeeding rate of 70% projected for 2030 (6). More (90%) NGDM initiated breastfeeding immediately and within the first hour of life compared to GDM (83.9%). Previous findings had documented that women with GDM faced many challenges in breastfeeding. Infants of women with GDM were at risk for hypoglycemia and may require treatment that needed them to stay in separate rooms for

mothers and newborns (19). This is one of the identified barriers for women with a history of GDM to initiate early breastfeeding. In addition, women with a history of GDM commonly had delayed lactogenesis (20), premature delivery, cesarean delivery, and premature and neonatal hyperglycemia that affected their lactation journey (9). It has been suggested that these common problems among women with GDM increase the probability of formula milk use (21). It also has been documented that insufficient breastmilk and inadequate maternity leaves were the main barriers to EBF for their child (12,16,22).

The correlation between breastfeeding practices and GDM status also showed a negative correlation in breastfeeding practices ( $r=-0.35$ ,  $p=.536$ ). These results matched those observed in an earlier study. The prevalence of 6 months of EBF among women with a history of GDM in Thailand was far lower than the national and global target (23). This finding corroborates the ideas from previous findings (24), which documented that early breastfeeding cessation among women with GDM was associated with breastfeeding problems at home, less than three months of maternity leave, cesarean delivery, and low socio-economic status. Although several studies on the benefits of breastfeeding among women with GDM have been undertaken, women with GDM were less likely to breastfeed their children (25).

In the literature, high breastfeeding duration and intensity rate have been associated with a lower rate of postnatal diabetes (26). The result of the current study matched those observed in earlier studies. Breastfeeding provided a protective effect on the development of postnatal comorbidities among women with GDM (27,28). These findings may help us understand that breastfeeding among women with a history of GDM is low-cost and effective prevention to reduce the risk of chronic diseases later in their lives.

Noticeably, this study documented non-significant results on KAP scores between 2 groups. One of the main reasons behind this was that breastfeeding knowledge, attitude, and practices among participants in both groups were comparable. Therefore, it can be assumed that the government's efforts in promoting breastfeeding were successful and effective, regardless of the status of GDM among the mothers.

It is noteworthy that the strength of this study was the large sample size. The large sample size provided an insight into the level of knowledge, attitude, and practices on breastfeeding among women with and without GDM in Malaysia. However, this survey did not engage women without a Facebook account due to practical constraints. Furthermore, recall bias in responding to the survey questions for participants who had a delivery two years prior may be possible.

## CONCLUSION

This current study has shown that breastfeeding knowledge, attitude, and practices were comparable among mothers with and without GDM. Both groups scored good for breastfeeding knowledge. Although all participants had good breastfeeding knowledge regardless of their GDM status, their breastfeeding attitude and practices were still sub-optimal, which could be a target for further intervention and research. Further studies need to be conducted to investigate breastfeeding practices and challenges faced during breastfeeding among GDM mothers in Malaysia since they are linked to having poor breastfeeding outcomes. Therefore, it could provide an insight into the effectiveness of the knowledge delivery program on breastfeeding targeting this population

## ACKNOWLEDGEMENTS

We would like to express our gratitude to all participants involved in this survey. This study was funded by a UiTM grant, no: 600-UITMSEL (PI. 5/4) (050/2020).

## REFERENCES

1. WHO. Breastfeeding [Internet]. 2020 [cited 2021 Mar 12]. Available from: [https://www.who.int/health-topics/breastfeeding#tab=tab\\_3](https://www.who.int/health-topics/breastfeeding#tab=tab_3)
2. Brahm P, Valdīs V. Sociedad Chilena de Pediatría CInIcal OverVlew Benefits of breastfeeding and risks associated with not breastfeeding Beneficios de la lactancia materna y riesgos de no amamantar. Benefits of breastfeeding and risks associated with not breastfeeding [Internet]. 2017;88(1):15–21. Available from: [https://scielo.conicyt.cl/pdf/rcp/v88n1/en\\_art01.pdf](https://scielo.conicyt.cl/pdf/rcp/v88n1/en_art01.pdf)
3. CDC. Breastfeeding benefits both baby and mom . 2021.
4. Moon JH, Kim H, Kim H, Park J, Choi W, Choi W, et al. JOURNAL. Science Translational Medicine. 2020;12(541).
5. 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. *Annals of Internal Medicine*. 2015;163(12):889–98.
6. Walters D, Kakietek JJ, Eberwein JD, Pullum T, Shekar M. Breastfeeding in the 21st century. *The Lancet*. 2016;387(10033):2087.
7. Nguyen PTH, Pham NM, Chu KT, Van Duong D, Van Do D. Gestational Diabetes and Breastfeeding Outcomes: A Systematic Review. *Asia-Pacific Journal of Public Health*. 2019;31(3):183–98.
8. Kim H, Toyofuku Y, Lynn FC, Chak E, Uchida T, Mizukami H, et al. Serotonin regulates pancreatic beta cell mass during pregnancy. *Nature Medicine*. 2010;16(7):804–8.

9. Haile ZT, Oza-Frank R, Azulay Chertok IR, Passen N. Association between History of Gestational Diabetes and Exclusive Breastfeeding at Hospital Discharge. *Journal of Human Lactation*. 2016;32(3):NP36–43.
10. Oza-Frank R, Moreland JJ, McNamara K, Geraghty SR, Keim SA. Early Lactation and Infant Feeding Practices Differ by Maternal Gestational Diabetes History. *Journal of Human Lactation*. 2016 Nov 1;32(4):658–65.
11. Doughty KN, Ronnenberg AG, Reeves KW, Qian J, Sibeko L. Barriers to Exclusive Breastfeeding Among Women With Gestational Diabetes Mellitus in the United States. *JOGNN - Journal of Obstetric, Gynecologic, and Neonatal Nursing*. 2018;47(3):301–15.
12. Al Ketbi MI, Al Noman S, Al Ali A, Darwish E, Al Fahim M, Rajah J. Knowledge, attitudes, and practices of breastfeeding among women visiting primary healthcare clinics on the island of Abu Dhabi, United Arab Emirates. *International Breastfeeding Journal*. 2018;13(1):1–14.
13. Malaysia M of H. Breastfeeding promotion. Ministry of Health Malaysia. 2020.
14. Huang P, Yao J, Liu X, Luo B. Individualized intervention to improve rates of exclusive breastfeeding: A randomized controlled trial. *Medicine (United States)*. 2019 Nov 1;98(47).
15. Wang Y, You H xuan, Luo B ru. Exploring the breastfeeding knowledge level and its influencing factors of pregnant women with gestational diabetes mellitus. *BMC Pregnancy and Childbirth*. 2020;20(1):1–9.
16. Marzo, Roy Rillera, Alvinder Singh Gill, Abdus Salam KZR. Knowledge, Attitude and Practice on Exclusive Breastfeeding among Mothers in Malaysia. *International Medical Journal*. 2019;26(2):77–80.
17. Kim Y, Lee JL, Jang IS, Park S. Knowledge and Health Beliefs of Gestational Diabetes Mellitus Associated with Breastfeeding Intention Among Pregnant Women in Bangladesh. *Asian Nursing Research*. 2020;14(3):144–9.
18. Jai AN, Kassim ABMohd, Samad AA, Baharuddin A, Rosman A, Naidu BM, et al. National Health And Morbidity Survey 2016 : Maternal And Child Health (MCH). Kementerian Kesihatan Malaysia. 2016;2:276.
19. Huang L, Chen X, Zhang Y, Sun G, Zhong C, Wang W, et al. Gestational weight gain is associated with delayed onset of lactogenesis in the TMCHC study: A prospective cohort study. *Clinical Nutrition*. 2019;38(5):2436–41.
20. Much D, Beyerlein A, Roßbauer M, Hummel S, Ziegler AG. Beneficial effects of breastfeeding in women with gestational diabetes mellitus. *Molecular Metabolism*. 2014;3(3):284–92.
21. Cascone D, Tomassoni D, Napolitano F, Di Giuseppe G. Evaluation of knowledge, attitudes, and practices about exclusive breastfeeding among women in Italy. *International Journal of Environmental Research and Public Health*. 2019;16(12).
22. 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. *International Breastfeeding Journal*. 2019;14(1):1–8.
23. Morrison MK, Collins CE, Lowe JM, Giglia RC. Factors associated with early cessation of breastfeeding in women with gestational diabetes mellitus. *Women and Birth*. 2015;28(2):143–7.
24. Kim HN, Jung YA, Kang LL, Park HK, Hwang HS, Park KY. Association between breastfeeding and prevalence of diabetes in Korean parous women: The Korea National Health and Nutrition Examination Survey, 2010-2014. *Korean Journal of Family Medicine*. 2018;39(5):273–8.
25. Ziegler AG, Wallner M, Kaiser I, Rossbauer M, Harsunen MH, Lachmann L, et al. Long-term protective effect of lactation on the development of type 2 diabetes in women with recent gestational diabetes mellitus. *Diabetes*. 2012;61(12):3167–71.
26. Ley SH, Chavarro JE, Li M, Bao W, Hinkle SN, Wander PL, et al. Lactation duration and long-term risk for incident type 2 diabetes in women with a history of gestational diabetes mellitus. *Diabetes Care*. 2020;43(4):793–8.
27. Vandyousefi S, Goran MI, Gunderson EP, Khazaei E, Landry MJ, Ghaddar R, et al. Association of breastfeeding and gestational diabetes mellitus with the prevalence of prediabetes and the metabolic syndrome in offspring of Hispanic mothers. *Pediatric Obesity*. 2019;14(7):1–10.