

Determinants of Non-Exclusive Breastfeeding Practice During the First 6 Months After an Elective Caesarean Birth: A Prospective Cohort Study

Noraini Mohamad (✉ mnoraini@usm.my)

Universiti Sains Malaysia - Kampus Kesihatan <https://orcid.org/0000-0002-1179-3005>

Norkhafizah Saddki

Universiti Sains Malaysia - Kampus Kesihatan

Nazirah Johar

Universiti Sains Malaysia - Kampus Kesihatan

Zaharah Sulaiman

Universiti Sains Malaysia - Kampus Kesihatan

Tengku Alina Tengku Ismail

Universiti Sains Malaysia - Kampus Kesihatan

Research

Keywords: Non-exclusive breastfeeding, caesarean birth, breast milk

Posted Date: February 19th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-207813/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License. [Read Full License](#)

Abstract

Background: Caesarean birth is associated with higher rate of non-exclusive breastfeeding (NEBF) than vaginal birth. NEBF refers to the provision of food or fluid besides breast milk, excluding drugs and vitamins, to infants before 6 months of age. This study determined the prevalence and factors associated with NEBF practice during the first 6 months after an elective caesarean birth.

Methods: This prospective cohort study recruited 171 mothers who underwent an elective caesarean birth at two tertiary hospitals in Kelantan, Malaysia. Face-to-face interviews were conducted 2 days after the caesarean birth to obtain information on the variables of interest. Follow-up phone calls were made at 1, 3 and 6 months after birth to determine the prevalence of NEBF. Simple and multiple logistic regressions were used for data analysis.

Results: The prevalence of NEBF was 19.9%, 40.4% and 57.9% at 1 month, 3 months and 6 months, respectively. Factors found to be associated with NEBF practice at 1 month were age of the last child, last child breastfeeding practice, and confidence with adequacy of breast milk. Last child breastfeeding practice was also found to be associated with NEBF practice at 3 months, as well as perception of insufficient of breast milk supply. At 6 months, perception of insufficient breast milk supply remains as one of factors associated with NEBF practice, together with experience of breast pain as baby suckled.

Conclusion: The prevalence of NEBF increased as the child grew older. Perceived breast milk insufficiency was the only factor associated with NEBF at all months.

Introduction

Breast milk is the best nutritional source for babies. It is unique and cannot be replaced by other foods, including infant formula or animal milk. Breast milk delivers adequate calories and the necessary proteins, fat, lactose, vitamins, iron, minerals and enzymes in the amounts required for growing infants [1]. Therefore, it is recommended that breastfeeding should be initiated within the first hour after birth and the babies should be breastfed exclusively for the first 6 months of life [2]. Exclusive breastfeeding (EBF) refers to the act of feeding infants with only breast milk, either directly from their mothers or wet nurses or expressed breast milk, with no added liquids or solids except for syrups consisting of vitamins, mineral supplements or medications [3].

The global rate of EBF was reported as 43% in 2015, a 5% increase over the 38% reported in 2007 [4, 5]. However, if the global rate target of World Health Assembly Resolution 65.6 of at least 50% by 2025 is to be met, a 5% increase over 10 years will be insufficient [6].

The postpartum period can be challenging for nursing mothers. It is even more stressful for mothers who have had a caesarean delivery [7, 8]. Studies have found that women who have given birth via a caesarean section were less likely to breastfeed their babies as compared to those who had a vaginal delivery [9, 10]. Caesarean delivery has also been associated with delayed breastfeeding initiation, shorter breastfeeding duration and a lower rate of EBF than vaginal delivery [11, 12]. A study among Italian women found that elective and emergency cesarean deliveries are similarly associated with a decreased rate of exclusive breastfeeding compared to vaginal birth. They found that only 3.5% post-caesarean birth women practiced breastfeeding compared to 71.5% of women with vaginal birth who breastfed their infants in the birth room [10].

The delayed initiation of breastfeeding after a caesarean delivery may be caused by the same factor responsible for delaying skin to skin contact between mother and baby after birth, which is the mother's physical condition after the caesarean delivery [13]. Skin-to-skin contact is defined as the placement of the naked baby on the mother's bare abdomen or chest immediately or soon after birth for at least 1 hour or until the baby is ready to breastfeed [14].

Women who have just had a caesarean delivery generally have pain at the surgical site that leads to limitation in mobility and causes them a difficulty in positioning the baby during breastfeeding. As a result, they may require frequent assistance and a refusal to breastfeed ensues from their frustration [7, 8]. However, with proper support from nurses and doctors, these women will be more likely to breastfeed [15]. It has been shown that breastfeeding education and interventions can effectively increase breastfeeding duration and exclusivity among women [16]. The Ministry of Health of Malaysia recommends strengthening breastfeeding education and support to address specific breastfeeding problems that are faced by women who have had a caesarean section and can often lead to breastfeeding cessation [17].

Proper planning is the cornerstone of a successful program. In efforts to increase the EBF rate among women after a caesarean delivery, the factors that contribute to their non-exclusive breastfeeding (NEBF) must first be identified. A good understanding of the factors that impede EBF among women after a caesarean delivery will facilitate the development of effective strategic plans that provide breastfeeding education and support for these women so that they will initiate and continue EBF for up to 6 months. This study aimed to determine the prevalence and factors associated with NEBF practice at 1 month, 3 months and 6 months after an elective caesarean delivery in Kelantan, Malaysia.

Method

Study design and participants

A prospective cohort study was conducted from 1 January 2017 to 31 December 2017 among women admitted for an elective caesarean delivery at two tertiary hospitals in Kelantan, Malaysia. Only women admitted for an elective caesarean delivery were included in this study. The exclusion criteria were women who had babies born with a congenital anomaly, women who were unable to initiate breastfeeding due to maternal or neonatal complications and women who had been diagnosed with a psychiatric disorder.

A convenience sampling method was applied in this study. Due to the limited sample of mothers who had planned for an elective caesarean delivery, all mothers who were admitted for an elective caesarean delivery during our study period were invited to participate in this study. Among these, 107 (54.9%) participants were recruited from Hospital Universiti Sains Malaysia and 88 (45.1%) from Hospital Raja Perempuan Zainab II. The sample size was calculated using PS software. The expected proportion of women who had initiated breastfeeding within 1 hour after delivery among those who practised EBF was estimated at 46.1%, as reported by Tengku Alina et al. [18]. If the proportion of women who had initiated breastfeeding early but did not practise EBF were 68.6%, then we would need a total of 150 samples (75 women who practise NEBF and 75 women who practise EBF) to be able to reject the null hypothesis with a probability (power) of 0.8. The type I error probability was set at 0.05. In anticipation of a 30% loss in follow-up, a sample size of 195 was decided for this study.

Research Tools

A structured questionnaire was used in this study. The questionnaire was divided into two sections according to the phases of the data collection: Phase 1 (day 2 after an elective caesarean delivery) and Phase 2 (1 month, 3 months and 6 months after an elective caesarean delivery).

The first section of the questionnaire was used in Phase 1. This section contains questions used to obtain the following variables of interest: 1) socio-demographic characteristics, 2) previous obstetric and breastfeeding history, 3) current obstetric profile, 4) current caesarean delivery information (type of anaesthesia and length of hospital stay), 5) establishment of skin-to-skin contact immediately after caesarean delivery, 6) infant responses during breastfeeding initiation (willingness to feed, appears sleepy and has the ability to attach well to the breast), 7) experience during breastfeeding initiation (the difficulty level in attaching the infant to the breast and placing the infant in the proper breastfeeding position), 8) hospital support (the frequency of assistance during initiation and privacy for breastfeeding), 9) experience during breastfeeding (the frequency of feeling embarrassed to breastfeed in an open area, feeling it is easy to breastfeed [referring to women who have positive feelings with the overall breastfeeding experience], feeling it is comfortable to breastfeed and feeling confident that the amount of breast milk is adequate), 10) post-surgical and anaesthesia effects (the frequency of having difficulty moving due to pain, feeling tired, feeling worried or sad, headache or dizziness, nausea, feeling sleepy or pain at the surgical site) and 11) breastfeeding difficulties associated with breast conditions (the perception of insufficient or no milk, a cracked or inverted nipple and breast pain as the baby suckles). A perception of insufficient milk is defined as the mother's perception that she is not producing an adequate supply of breast milk to meet her infant's needs [19].

The second section of the questionnaire was used in Phase 2. The second section was used to obtain information on feeding practices at 1 month, 3 months and 6 months after a caesarean delivery. This section of the questionnaire contains 4 questions that ask mothers if they feed their babies any of the following: 1) breastmilk, 2) plain water, 3) infant formula or 4) complementary food.

The frequency of each practice was assessed using the following response options: "Never" means that the infant had never been fed that item, "seldom" means the baby had been fed it fewer than 7 days per week and "always" means that the baby had been fed it once daily or more. The questionnaire has been validated and was developed in Bahasa Malaysia by Muda et al.[20]. If the mother did not practise EBF, she was then asked to give her reasons.

Data Collection

Written informed consent was obtained from the women who agreed to participate in the study, and their telephone numbers were also recorded. The study was conducted in 2 phases as previously highlighted. Phase 1 was carried out when the women were at the hospital using the first section of the questionnaire on day 2 after the elective caesarean delivery. The questionnaire was administered by the main author and a trained research assistant through a face-to-face interview. Information on the patient's current obstetric profile and caesarean delivery was obtained from the medical records. Phase 2 was conducted via telephone after 1 month, 3 months and 6 months to obtain information regarding the mothers' feeding practices by using the second section of the questionnaire.

Statistical analysis

The analysis started with a data exploration to check the normality of the data and for potential errors in the data entry. The data were presented as mean and standard deviation (SD) for the numerical variables and frequency with percentage (%) for the categorical variables. The data were analysed using simple and multiple logistic regression analyses to determine the factors associated with NEBF practice at 1 month, 3 months and 6 months after an elective caesarean delivery. The independent variables were all variables collected during the Phase 1 and Phase 2 of the

study as follows: socio-demographic characteristics, previous obstetric and breastfeeding history, current obstetric profile, current caesarean delivery information, establishment of skin-to-skin contact, infant responses during breastfeeding initiation, experience during breastfeeding initiation, hospital support, post-surgical and anaesthesia effects and breastfeeding difficulties associated with breast conditions.

Following the simple logistic regression analysis, variables with p-value less than 0.25 and variables that were deemed clinically important were included in the subsequent multivariable analysis. This cut point was set at a value larger than the level of significance to obtain as many important variables as possible for selection for inclusion in the model. In the multiple logistic regression analysis, the variables were selected using the forward selection likelihood ratio (LR) method. Following the variable selection, the importance of each variable was verified. All possible two-way interaction terms and multicollinearity problems were checked. The final model was assessed for fitness using a Hosmer-Lemeshow goodness-of-fit test. The classification table for sensitivity and specificity as well as the area under the receiver operating characteristic (ROC) curve were also obtained. Influential outliers were identified using the Cook's influence statistics that measure the influence of cases on the predicted values. Data points above 1.0 were considered influential outliers [21]. All statistical analyses were performed with SPSS for Windows version 24.0 (IBM Corp., Armonk, NY, USA). A p-value less than 0.05 was considered as statistically significant.

Results

Demographic characteristics

A total of 195 women participated in this study in Phase 1. None of the women were excluded and all 195 completed the first phase. In Phase 2, only 171 women could be contacted via all of the follow-up phone calls at 1 month, 3 months and 6 months post-partum to complete the study, providing an 87.6% response rate.

Most of the respondents were Malay (98.8%) and remaining were Chinese (1.2%). The mean (SD) age of the respondents was 32.3 years (SD 4.83). Nearly half of the respondents had received education up to the secondary (48.5%) and tertiary levels (48.5%), and more than half were employed (57.9%). Most respondents had at least 1 previous child (79.0%), and the age of the last child for most respondents was 5 years and below (82.2%). The characteristics of the respondents are shown in Table 1.

Table 1
Characteristics of the respondents (n = 171)

Variable	Frequency (%)
Age group (years)	
20–30	62 (36.3)
31–40	101 (59.0)
> 40	8 (4.7)
Race	
Malay	169 (98.8)
Chinese	2 (1.2)
Highest education level	
No formal education/Primary School	5 (3.0)
Secondary school	83 (48.5)
Tertiary educational level	83 (48.5)
Employment status	
Employed	99 (57.9)
Unemployed	72 (42.1)
Parity	
Nulliparous	36 (21.0)
Primiparous/multiparous	135(79.0)
Age of last child (year) (n = 135)	
≤ 5	111 (82.2)
> 5	24 (17.8)

Previous breastfeeding experience and breastfeeding experience initiation

More than two-thirds of the respondents (78.9%) had breastfed their last child, and almost two-thirds (65.9%) had practised EBF for 6 months for their last child. Most respondents established skin-to-skin contact with their infants immediately after the caesarean birth (77.8%) and initiated breastfeeding within 1 hour after birth (73.7%). During the first 24 hours following the caesarean birth, almost half of the women (43.8%) perceived their breast milk as insufficient. Some also experienced breast symptoms, such as breast pain (43.8%) or a cracked nipple (22.8%).

Prevalence of NEBF at 1 month, 3 months and 6 months

Figure 1 shows the prevalence of NEBF among the respondents at 1 month, 3 months and 6 months, which was 19.9%, 40.4% and 57.9%, respectively. The main reason given by most respondents for not practising EBF at each follow-up point was insufficient breast milk.

Factors associated with NEBF at 1 month,3 months and 6 months

The simple logistic regression analysis to determine the factors associated with NEBF at 1 month identified 13 variables with p-values less than 0.25. These variables were included in the multiple logistic regression analysis, and 3 of them were found to be significantly associated with NEBF at 1 month. The variables were the age of the last child, breastfeeding practice for the last child and perceived breast milk adequacy (Table 1).

The results of the simple logistic regression analysis of the factors associated with NEBF at 3 months after an elective caesarean birth identified 19 variables with p-values below 0.25, and these were included in the multiple logistic regression analysis. At the multivariate level, the breastfeeding practice for the last child and the perception of having no breastmilk were significantly associated with NEBF at 3 months after a caesarean birth (Table 2).

Table 2
Factors associated with NEBF practice at 1 month after an elective caesarean delivery by multiple logistic regression analysis ($n = 171$)

Variables	Adj.OR	(95% CI)	Wald Stat.(df)	<i>p-value</i>
Age of last child (year)				
No previous child	1.00			
≤ 2	0.10	(0.02, 0.66)	5.76 (1)	0.016
3–5	0.10	(0.02, 0.53)	7.36 (1)	0.007
> 5	0.15	(0.02, 0.92)	4.18 (1)	0.041
Last child breastfeeding practice				
EBF for 6 months	1.00			
Did not practice EBF	3.78	(1.39, 10.29)	6.77 (1)	0.009
No breastfeeding experience	0.23	(0.04, 1.31)	2.74 (1)	0.098
Felt confident breast milk is adequate				
Very often/often	1.00			
Sometimes/seldom	1.63	(0.63, 4.22)	0.99 (1)	0.318
Never	4.83	(1.06, 21.96)	4.15 (1)	0.042
Adj. OR = Adjusted odds ratio				
The Hosmer–Lemeshow goodness of fit test p -value = 0.676				
Classification table = 80.1%.				
The area under ROC curve = 0.739				
There are no interaction and multicollinearity problems.				

The simple logistic regression analysis used to predict the factors associated with NEBF practice at 6 months after an elective caesarean birth identified 15 variables with p -values less than 0.25, and these were included in the multiple logistic regression analysis. At the multivariate level, the factors contributing to NEBF practice at 6 months were: a perception of no breastmilk and the experience of breast pain as the baby suckled (Table 3).

Table 3
Factors associated with NEBF practice at 3 months after an elective caesarean delivery by multiple logistic regression analysis ($n = 171$)

Variables	Adj.OR	(95% CI)	Wald Stat.(df)	<i>p-value</i>
Last child breastfeeding practice				
EBF for 6 months	1.00			
Did not practice EBF	3.72	(1.69, 8.16)	10.69 (1)	0.001
No breastfeeding experience	1.81	(0.70, 4.67)	1.52 (1)	0.217
Perceived no milk				
Never	1.00			
Sometimes/seldom	1.72	(0.80, 3.67)	1.94 (1)	0.164
Very often/often	4.97	(1.67, 14.85)	8.26 (1)	0.004
Adj. OR = Adjusted odds ratio				
The Hosmer–Lemeshow goodness of fit test p -value = 0.897				
Classification table = 69.6%				
The area under ROC curve = 0.720				
There are no interaction and multicollinearity problems.				

Table 4
Factors associated with NEBF practice at 6 months after an elective caesarean delivery by multiple logistic regression analysis ($n = 171$)

Variables	Adj.OR	(95% CI)	Wald Stat.(df)	<i>p</i> -value
Perceived no milk				
Never	1.00			
Sometime/seldom	3.27	(1.46, 7.32)	8.35 (1)	0.004
Very often/often	10.06	(2.41, 41.99)	10.02 (1)	0.002
Breast pain as baby suckled				
Never	1.00			
Sometime/seldom	2.74	(1.23, 6.15)	6.03 (1)	0.014
Very often/often	4.74	(1.09, 20.56)	4.31 (1)	0.038
Adj. OR = Adjusted odds ratio				
The Hosmer–Lemeshow goodness of fit test <i>p</i> -value = 0.146				
Classification table = 68.4%				
The area under ROC curve = 0.724				
There are no interaction and multicollinearity problems.				

Discussion

In this study, the prevalence of NEBF among women after an elective caesarean delivery increased as the age of the child increased: 19.9%, 40.4% and 57.9% at 1 month, 3 months and 6 months, respectively. The prevalence of NEBF at 1 month and 3 months among women in this study is lower than those reported in the latest National Health Morbidity Survey (NHMS), which showed 47.1% and 52.6% at 0–2 and 0–4 months, respectively, while the prevalence of NEBF at 6 months in this study was comparable to the national rate of 52.9% among infants below 6 months old [17]. In Italy, a study among 398 women who delivered by elective caesarean also showed comparable findings, indicating that 25.5%, 44.9% and 53.4% of the women discontinued EBF at 7 days, 3 months and 6 months, respectively [10]. A 6-month cohort study in Hunan, China reported higher NEBF rates for woman after a caesarean delivery, with 28.7% and 79.8% of the mothers discontinuing EBF at 1 month and 6 months, respectively. However, at 3 months after a caesarean delivery, a finding similar to the current study was reported, with 40% of the mothers in Hunan discontinuing EBF [11]. In all studies, the prevalence of NEBF appears to increase as babies grow older.

In our study, women who already had at least 1 child, regardless of the age of the last child, were more likely to continue EBF for 1 month after a caesarean delivery than those who did not have any children. This finding may be due to first-time mothers having less awareness of the advantages of breastfeeding as compared to multigravida women [22]. It has been reported that early breastfeeding problems and mixed feeding practices at the time of hospital discharge are more common among primiparous women than multiparous women. Multiparous mothers have also shown significantly longer breastfeeding duration than primiparous mothers [23].

Positive EBF practices are more prevalent among multiparous mothers, most probably due to their higher maternal breastfeeding self-efficacy, in which the mother feels confident in her ability to breastfeed. The self-efficacy also increases with the past successful experience and performance [24]. Besides previous positive breastfeeding experience, women can also develop their self-efficacy through the exposure to vicarious experiences (such as observing other mothers who breastfeed), watching videos related to breastfeeding, receiving verbal persuasion and encouragement from their friends and family, and the generation of pleasant and positive feelings towards breastfeeding [25]. Therefore, strategies to increase the EBF rate among primiparous women should focus on ways to improve self-efficacy for continuing EBF and subsequently, to help them dealing with any breastfeeding challenge [23].

The women who did not practise EBF for their last child were more likely to discontinue EBF at 1 month and 3 months after a caesarean delivery. Our findings are in agreement with a study in Hong Kong which showed that the participants who did not breastfeed exclusively or who practised EBF for up to only 2 months were more likely to stop EBF earlier than those who breastfed exclusively for more than 2 months [26]. A systematic review on breastfeeding experiences concluded that previous breastfeeding experience consistently correlates with subsequent breastfeeding initiation and duration. Previous short breastfeeding duration and unsatisfactory experience can negatively affect subsequent breastfeeding practices [27]. A qualitative study in the United States found that women who had successfully breastfed in the past were intrinsically motivated from their own emotional attachment to the practice. Besides, they were also extrinsically motivated from their family who encouraged them to

breastfeed [28]. It is therefore recommended for the midwives and lactation consultants to provide individualised interventions to the mothers based on their previous breastfeeding experience in order to improve breastfeeding initiation and duration [27].

In our study, the women who had never felt confident that their breast milk was adequate or who had at any point perceived that they had no breast milk were more likely to discontinue EBF within the first 6 months after a caesarean delivery.

Other studies in Vietnam, Taiwan and Australia have noted the same perception which is the most common reason why the mothers discontinued EBF [29–31]. It could be related to the low level of maternal self-confidence in the ability to breastfeed. This fact is further supported by a study by Blyth et al. which revealed that the mothers with a high breastfeeding self-efficacy were significantly more likely to practise EBF at 1 week and 4 months postpartum than the mothers with low breastfeeding self-efficacy [31].

Support and reassurance from hospital staff are very crucial at this stage. Mothers should also be educated on how to assess their breastmilk adequacy so that they will be able to distinguish between a perceived breastmilk insufficiency and a true breastmilk insufficiency. The best way to assess breastmilk supply is by monitoring infant weight gain and measuring stool output, and this can be managed with patient education, support and reassurance [32].

Breastfeeding difficulties due to breast conditions such as sore or cracked nipples or breast engorgement commonly occur during the first few days of breastfeeding. These conditions can arise as a result of improper latching or improper positioning of the baby during feeding [32]. In our study, mothers who experienced breast pain as the baby suckled were more likely to discontinue EBF at 6 months after a caesarean delivery. A study in Kelantan, Malaysia showed that sore or cracked nipples, difficulty with latching and breast engorgement were associated with the discontinuation of EBF at 1 month [18]. On the other hand, a study done among women in Argentina found that mothers who had no nipple problems and whose child had an appropriate suckling technique were more likely to practise EBF for a longer duration [33]. Breastfeeding difficulties that persist beyond the first few days after birth can be discouraging and may lead to early discontinuation of EBF. With the right help, however, most of these difficulties can be overcome.

In this study, none of the mothers' socio-demographic characteristics, including age, educational level or employment status, were significantly associated with their NEBF practices during the first 6 months after an elective caesarean delivery. On the contrary, a multilevel analysis on the factors associated with NEBF in five Asian countries found that first-born infants, working mothers and higher maternal age were the significant individual factors associated with NEBF practice [34]. Another study in Ethiopia reported that mothers who completed primary school were less likely to practise NEBF as compared to mothers with no formal education, while governmental employees were more likely to practise NEBF [35].

The findings of the current study provide important information on the factors associated with NEBF practice among women at 1, 3 and 6 months after an elective caesarean birth. Knowledge about how these factors influence breastfeeding practices are relevant to planning and developing the breastfeeding educational intervention modules that focus on women who are planned for an elective caesarean birth. The educational interventions should also be delivered to women during the antenatal period so that they are well-informed about the circumstances that they may encounter during the initiation and maintenance of EBF, including perceived breast milk insufficiency and breast pain. As a result, they will be physically and mentally well-prepared to face the challenges.

The interventions should include information on different types of breastfeeding positions that are convenient for the women after a caesarean. They should also provide information on how to increase breast milk production since a perceived breast milk insufficiency has been shown to be the only factor associated with NEBF practice at all months.

Furthermore, mothers must be informed about where to seek help if they do face problems related to breastfeeding after being discharged from the hospital. This can be done by providing them the lactational helpline number, for which the necessary breastfeeding advice and guidance can be offered. Mothers should also be encouraged to join the lactation support group so that they can discuss their breastfeeding problems with other women who have had an elective caesarean and share their solutions to those problems.

This study has several limitations. The findings of this study cannot be inferred to all women admitted for an elective caesarean delivery in Malaysia as the sample was restricted to only two tertiary hospitals in Kelantan, Malaysia and women were recruited using convenient sampling. Furthermore, this study was carried out at hospitals that are located in an area where Malays are the predominant ethnic group. The results are thus not generalizable to other racial groups or settings. Therefore, replicating this study in a larger, more racially or ethnically diverse sample should be considered.

Conclusion

In this study, perceived breast milk insufficiency, lack of previous experience with EBF, having no previous child and the experience of breast pain while breastfeeding were all associated with NEBF practice among women during the first 6 months after an elective caesarean delivery. Perceived breast milk insufficiency was the only factor associated with NEBF at all months. Thus, mothers must be taught how to assess milk

adequacy and maintain or increase breast milk production. Mothers also need to be convinced that their breast milk is adequate and they should continue breastfeeding. Health professionals and lactation consultants play the important roles in encouraging mothers to initiate breastfeeding and maintain EBF for the first 6 months after a caesarean delivery.

Abbreviations

NEBF

Non-exclusive breastfeeding; FF

Declarations

Acknowledgements

The authors would like to thank the Director General of Health Malaysia for the permission to conduct this study at the Ministry of Health premise. The authors gratefully acknowledge all the mothers who participated in this study.

Funding

This study was funded by the Universiti Sains Malaysia Short Term grant (304/ PPSG/61313193).

Availability of data and materials

Data used in this study are available upon reasonable request. Please contact the corresponding author for data requests.

Authors' contributions

NM, NJ, and NKS were major contributors in the design of the study. All authors contributed in the design. NJ and NM contributed the data collection. NJ, NKS, NM, TATI and ZS analyzed and interpreted the data. NM and NJ were major contributors in writing the manuscript. All authors read and approved the final manuscript.

Ethics approval and consent to participate

The ethical approval to conduct this study was obtained from the Human Research Ethics Committee of Universiti Sains Malaysia [USM/JEPeM/16050192] and the Ministry of Health (MOH) Malaysia Medical Research and Ethics Committee [NMRR-16-2347-32612 (IIR)].

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

References

1. Australian Breastfeeding Association. Breastmilk Composition ; 2017.. Available at: <https://www.breastfeeding.asn.au/bfinfo/breastmilk-composition> (Accessed 2 November 2019).
2. UNICEF, World Health Organization. Capture the moment: Early initiation of breastfeeding: The best start for every newborn. New York: UNICEF;2018. Available at: https://www.unicef.org/publications/files/UNICEF_WHO_Capture_the_moment_EIBF_2018.pdf (Accessed 2 November 2019).
3. World Health Organization. Division of Child Health and Development. Indicators for assessing breast feeding practices. Geneva;1991. Available at: https://apps.who.int/iris/bitstream/handle/10665/62134/WHO_CDD_SER_91.14.pdf;jsessionid=130DC05D3043DEA3191DE63E869F438C?sequence=1. (Accessed 20 July 2020,].
4. From The First Hour Of Life. Making the case for improved infant and young child feeding everywhere. New York. UNICEF; 2016. Available at: <https://data.unicef.org/wp-content/uploads/2016/10/From-the-first-hour-of-life-1.pdf> (Accessed 4 November 2019]
5. The State of the World's Children 2009. Maternal and Newborn Health. New York: UNICEF;2008.. Available at: <https://www.unicef.org/sowc09/docs/SOWC09-fullreport-EN.pdf> . (Accessed 4 November 2019]

6. World Health Organization. Global nutrition targets 2025: Policy brief series. World Health Organization ; 2014. Available at; https://apps.who.int/iris/bitstream/handle/10665/149018/WHO_NMH_NHD_14.2_eng.pdf?Ua=1(Accessed 4 November 2019]
7. Tully, K.P. and H.L. Ball. Maternal accounts of their breast-feeding intent and early challenges after caesarean childbirth. *Midwifery*. 2014 ; 30(6): 712-719. <https://doi.org/10.1016/j.midw.2013.10.014>.
8. Sousa Ld, Pitangui ACR, Gomes FA, Nakano AMS, Ferreira CHJ. Measurement and characteristics of post-caesarean section pain and the relationship to limitation of physical activities. *Acta Paul Enferm*. 2009; 22(6):741-747. <http://dx.doi.org/10.1590/S0103-21002009000600003>.
9. Arora A, Manohar N, Hayen A, Bhole S, Eastwood J, Levy S, et al. Determinants of breastfeeding initiation among mothers in Sydney, Australia: findings from a birth cohort study. *Int Breastfeed J*. 2017; 12(39):1-10. DOI 10.1186/s13006-017-0130-0.
10. Zanardo V, Svegliado G, Cavallin F, Giustardi A, Cosmi E, Litta P, et al. Elective cesarean delivery: does it have a negative effect on breastfeeding? *Birth*. 2010; 37(4): 275-279. DOI: 10.1111/j.1523-536X.2010.00421.x.
11. Chen C, Yan Y, Gao X, Xiang S, He Q, Zeng G, et al. Influences of cesarean delivery on breastfeeding practices and duration: A prospective cohort study. *J Hum Lact*. 2018; 34(3):526-534. DOI: 10.1177/0890334417741434.
12. Hobbs AJ, Mannion CA, McDonald SW, Brockway M, Tough SC. The impact of caesarean section on breastfeeding initiation, duration and difficulties in the first four months postpartum. *BMC Pregnancy Childbirth*. 2016; 16(90): 1-9. DOI 10.1186/s12884-016-0876-1.
13. Zwedberg, S., J. Blomquist, and E. Sigerstad. Midwives' experiences with mother–infant skin-to-skin contact after a caesarean section: 'Fighting an uphill battle'. *Midwifery*. 2015; 31(1): 215-220. <http://dx.doi.org/10.1016/j.midw.2014.08.014>.
14. World Health Organization, UNICEF. Baby-Friendly Hospital Initiative. Revised Updated and Expanded for Integrated Care. Section 4: Hospital Self-Appraisal and Monitoring. 2009. Available at: https://www.unicef.org/nutrition/files/BFHI_2009_s4.pdf (accessed 20 July 2020)
15. Pérez-Ríos, N., G. Ramos-Valencia, and A.P. Ortiz. Cesarean delivery as a barrier for breastfeeding initiation: the Puerto Rican experience. *J Hum Lact*. 2008 ; 24(3):293-302. DOI: 10.1177/0890334408316078.
16. Rosuzeita F, Rabiaah MC, Rohani I, Shukri OM. The Effectiveness of Breastfeeding Intervention on Breastfeeding Exclusivity and Duration among Primiparous Mothers in Hospital Universiti Sains Malaysia. *Malays J Med Sci*. 2018 ; 25(1):53-56. <https://doi.org/10.21315/mjms2018.25.1.7>.
17. Institute for Public Health, National Institutes of Health, and Ministry of Health Malaysia, National Health and Morbidity Survey (NHMS) 2016: Maternal and Child Health. Vol. II: Maternal and Child Health Findings, in *Maternal and Child Health Findings*. 2016, Institute for Public Health, National Institutes of Health, Ministry of Health Malaysia: Kuala Lumpur. p. 23-28.
18. Tengku Alina, T.I., W.M. Wan Manan, and B. Mohd Isa, Factors predicting early discontinuation of exclusive breastfeeding among women in Kelantan, Malaysia. *Health and the Environment Journal*. 2013; 4(1):42-54.
19. Gatti, L. Maternal perceptions of insufficient milk supply in breastfeeding. *Journal of Nursing Scholarship*. 2008; 40(4):355-363.
20. Muda CMC, Ismail TAT, Jalil RA, Hairon SM, Sulaiman Z, Johar N. Maternal factors associated with the initiation of exclusive breastfeeding among mothers at one week after delivery in two selected hospitals in Kelantan, Malaysia. *Malays J Med Sci*; 2018. 25(4): p. 112-121. <https://doi.org/10.21315/mjms2018.25.4.11>.
21. Sarkar, S.K., H. Midi, and S. Rana, Detection of outliers and influential observations in binary logistic regression: An empirical study. *Journal of Applied Sciences*. 2011; 11(1):26-35.
22. Ambike D, Ambike A, Raje S, Chincholikar S. Knowledge, awareness and breastfeeding practices of postnatal mothers in a rural teaching hospital: a cross sectional survey. *Int J Reprod Contracept Obstet Gynecol*. 2017; 6(12):5429-34. DOI: 10.18203/2320-1770.ijrcog20175255.
23. Hackman NM, Schaefer EW, Beiler JS, Rose CM, Paul IM. Breastfeeding outcome comparison by parity. *Breastfeed Med*. 2015; 10(3):156-162. DOI: 10.1089/bfm.2014.0119.
24. Yang X, Gao L-I, Ip W-Y, Chan WCS. Predictors of breast feeding self-efficacy in the immediate postpartum period: A cross-sectional study. *Midwifery*; 2016. 41: 1-8. DOI: 10.1016/j.midw.2016.07.011.
25. Dennis, C.-L. Theoretical underpinnings of breastfeeding confidence: a self-efficacy framework. *J Hum Lact* 1999; 15(3):195-201. DOI: 10.1177/089033449901500303.
26. Bai, D.L., D.Y.T. Fong, and M. Tarrant. Previous breastfeeding experience and duration of any and exclusive breastfeeding among multiparous mothers. *Birth*. 2015; 42(1):70-77. DOI: 10.1111/birt.12152.
27. Huang, Y., Y.-Q. Ouyang, and S.R. Redding. Previous breastfeeding experience and its influence on breastfeeding outcomes in subsequent births: A systematic review. *Women and Birth*. 2019; 32(4):303-309. DOI: 10.1016/j.wombi.2018.09.003.
28. Racine EF, Frick KD, Strobino D, Carpenter LM, Milligan R, Pugh LC. How motivation influences breastfeeding duration among low-income women. *J Hum Lact*. 2009; 25(2):173-181. DOI: 10.1177/0890334408328129.
29. Nguyen PTK, Tran HT, Thai TTT, Foster K, Roberts CL, Marais BJ. Factors associated with breastfeeding intent among mothers of newborn babies in Da Nang, Viet Nam. *Int Breastfeed J*. 2018; 13(2):1-7. DOI 10.1186/s13006-017-0144-7.

30. Chang PC, Li SF, Yang HY, Wang LC, Weng CY, Chen KF. Factors associated with cessation of exclusive breastfeeding at 1 and 2 months postpartum in Taiwan. *Int Breastfeed J.* 2019; 14(18):1-7. <https://doi.org/10.1186/s13006-019-0213-1>.
31. Blyth R, Creedy DK, Dennis CL, Moyle W, Pratt J, De Vries SM. Effect of maternal confidence on breastfeeding duration: An application of breastfeeding self-efficacy theory. *Birth.* 2002; 29(4): p. 278-284. DOI: 10.1046/j.1523-536x.2002.00202.x.
32. Westerfield, K.L., K. Koenig, and R. Oh. Breastfeeding: Common Questions and Answers. *American family physician.* 2018; 98(6):368-373.
33. Cernadas JMC, Noceda G, Barrera L, Martinez AM, Garsd A. Maternal and Perinatal Factors Influencing the Duration of Exclusive Breastfeeding During the First 6 Months of Life. *J Hum Lact.* 2003; 19(2):136-144. DOI: 10.1177/0890334403253292.
34. Senarath, U., M.J. Dibley, and K.E. Agho. Factors associated with nonexclusive breastfeeding in 5 east and southeast Asian countries: a multilevel analysis. *J Hum Lact.* 2010; 26(3):248-257. DOI: 10.1177/0890334409357562.
35. Berhanu, M., W. Zemene, and M. Mekonnen. Prevalence and associated factors of nonexclusive breastfeeding to infants within the first 6 months in Gondar town, northwest Ethiopia. 2014; *Advances in Nursing.* 2015; 1-7. <http://dx.doi.org/10.1155/2015/142319>.

Figures

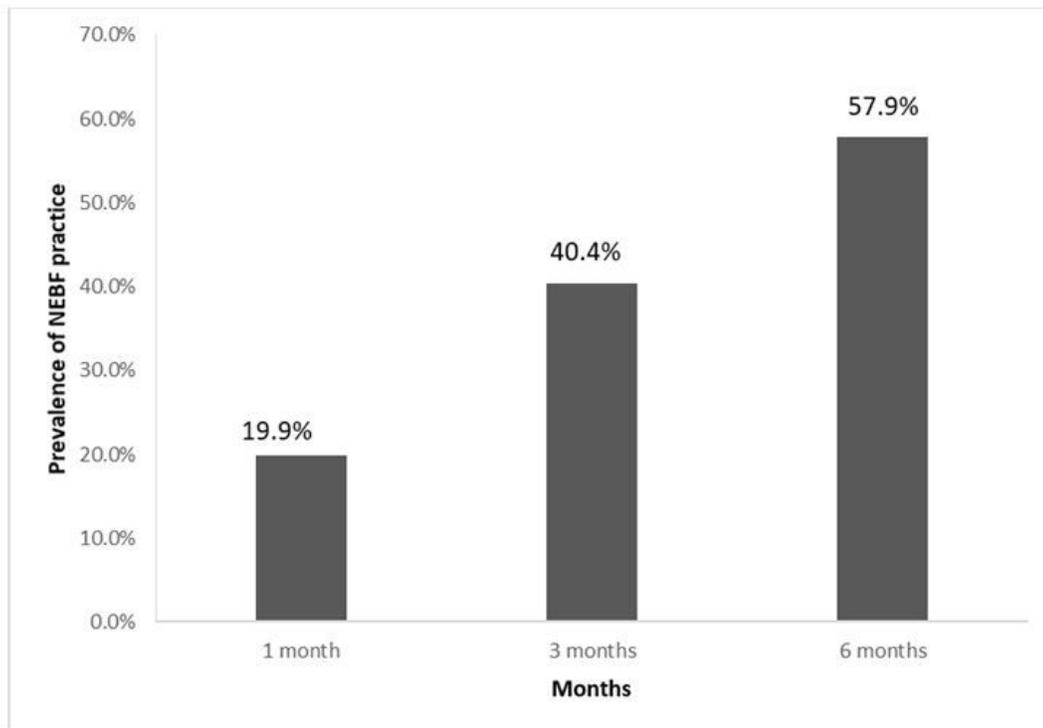


Figure 1

Prevalence of NEBF at 1 month, 3 months and 6 months after an elective caesarean delivery