

Research Article

Factors Influencing Breastfeeding Prevalence, Duration and Practices: A Longitudinal Study

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Abstract

Background: Exclusive breastfeeding is recommended for at least the first 6 months of life. The determinants of breastfeeding include factors related to the mother, child and family, health care system, public health policies, and social policies and culture.

Objective: To determine the association of individual and perinatal healthcare factors with breastfeeding prevalence, duration, and practices.

Methods: This longitudinal study enrolled 298 women, giving birth at the Hospital of Perugia. Data were collected through questionnaire-based survey at discharge, at three and six months postpartum.

Results: Prevalence of any breastfeeding was 98.66% at discharge (exclusive breastfeeding: 75.17%), 84.44% at three months and 83.94% at six months. Most women were nulliparous, not attending antenatal group education, birthing naturally, without labour analgesia/anaesthesia and never-smokers. Any breastfeeding at three months and exclusive breastfeeding at three months were strongly associated with antenatal group education, no labour analgesia/anaesthesia, early skin-to-skin contact and support for breastfeeding during the first three months postpartum. Any breastfeeding at six months was significantly associated with multiparity and support for breastfeeding during the first three months postpartum. No smoking at childbirth influenced breastfeeding at three months and at six months.

Conclusion: Our findings reflect the complexity of infant feeding and suggest a list of factors of antenatal and postnatal care as targets for focused evidence-based interventions aimed to promote breastfeeding.

Keywords: Breastfeeding; Breastfeeding/epidemiology; Breastfeeding/methods; Health education; Maternal-child nursing; Infant nutritional physiological phenomena; Smoking

Abbreviations: BF: Breast Feeding; CI: Confidence Interval; OR: Odds Ratio; RR: Relative Risk

Introduction

Breastfeeding (BF) has an essential role in child survival, nutrition and development and maternal health [1] and represents the optimal feeding practice for infants [2]. The World Health Organization recommends exclusive BF for at least the first six months of life [3]. Short-term benefits for infants include a reduced

risk of infant mortality, infectious disease and malocclusions [4], whereas long-term beneficial effects consist of the reduction in the prevalence of overweight [5], a reduced incidence of type 2 diabetes and higher intelligence points [4]. Regarding mothers' health, BF duration is inversely associated to breast cancer and might be protective against ovarian cancer and type 2 diabetes [4]. Moreover, BF duration reduces postpartum depression and depressive symptoms [6]. Many individual and perinatal healthcare factors influence the mother's decision to breastfeed [7] and the determinants of BF can be classified in factors related to the mother, child and family, the health care system, public health policies, and social policies and culture [8]. Promoting and supporting BF is considered a public health priority in Europe [8].

To sensitise on the relevance of promoting BF, a national survey has been recently conducted in Italy, investigating the prevalence and determinants of BF in the majority of Italian regions [9]. Even though many interventions and strategies aimed to improve BF have been adopted in Umbria, our region did not provide data for the national survey and information about prevalence of BF are lacking.

The objective of our study is to investigate the prevalence of BF practices among mothers giving birth at the Hospital of Perugia at the time of discharge and at three and at six months postpartum, and to evaluate the influence of perinatal healthcare and individual factors. We further focus on the role of smoking as determinant of BF.

Materials and Methods

Design and Participants

This longitudinal study enrolled the women, who gave birth at the Hospital of Perugia in the period from the 25th November 2016 to the 1st March 2017. The Hospital of Perugia is a Baby Friendly Hospital and promotes BF with interventions, such as rooming-in [10]. Exclusion criteria were defined as follows: (i) contraindications to BF related to the mother's health (e.g. severe viral infections, consumption of drugs contraindicated during BF), (ii) preterm children defined as gestational age less than 37 weeks, (iii) low weight at birth defined as lower than 2500 g, (iv) diagnosis of neonatal disorders or congenital malformation and (v) admission to intensive care unit. We interviewed 298 women who did not match the exclusion criteria at the time of discharge (t0) and administered a questionnaire aimed to investigate the prevalence of BF, perinatal healthcare factors that influence the choice of BF, and smoking status and history. After completing the verbal informed consent process, the participants assured their written consent to data collection and use. Participation was entirely on a voluntary basis and they could withdraw from the study at any time. No participation incentive was provided. The interview at the time of discharge was a face-to-face interview performed by the midwife. The mothers were contacted by phone at three (t1) and six (t2) months postpartum and administered a second questionnaire by phone investigating the continuation of BF and its determinants, the feeding practice, support for BF and smoking habits. The mothers were asked a series of questions related to the timing of introduction of formula water, formula and solid foods, in order to determine and classify the feeding practice. The phone interview was performed by the midwife. The questionnaire investigated parity, labour analgesia/anaesthesia, mode of birth, skin-to-skin contact, feeding practice, attendance to antenatal group education, individual antenatal education, support for BF, smoking history and status, and promotion of smoking cessation. In the interviews, the mothers self-reported clinical information, smoking history and

status and feeding practices. No further contact was established with women who previously answered to not breastfeed.

Data collection and analysis

We collected information about infant feeding practice. BF practices were classified in exclusive BF, predominant BF and complementary BF, according to the definition by World Health Organization [11]. We investigated health characteristics including parity, individual antenatal BF education, antenatal group education, labour analgesia or anaesthesia, mode of birth (vaginal birth or Caesarean section), early skin-to-skin contact (defined as skin-to-skin contact within 2 hours), and support for BF during the first three months postpartum (defined as partner, family and/or professional support). In Italy, maternity services, antenatal and postnatal education and support are care services funded by government and are offered to every childbearing woman independently from the socioeconomic status. Finally, we focused on maternal smoking habits, such as previous smoking habits, smoking status (never, former and current smokers), period of smoking cessation and relapse. Using the detailed history of maternal smoking status before and during pregnancy and during BF (t1 and t2), we were able to identify persistent smokers and to date postpartum relapses.

Outcome variables

The selected outcomes of interests were any BF at three months postpartum, exclusive BF at three months postpartum, and any BF at six months postpartum.

Data analysis

We checked data for completeness and entered (double entry) into Epi Info version 7.1.5.2. We performed descriptive statistics to characterize our sample using different variables of interest. We performed bivariate logistic regression analysis for each potentially explanatory variable with the outcome variables (any BF at three months, exclusive BF at three months, and any BF at six months). We estimated the Relative Risk (RR) of the outcomes of interest (any BF at three months, exclusive BF at three months, and any BF at six months) for maternal smoking. We determined statistical significance using Odds Ratios (OR) with 95% Confidence Interval (CI) and a RR with a 95% CI. Statistical significance was declared if p-value was <0.05.

Results

Description of the participants

The total number of mothers who participated in the study was 298. Among the 294 mothers who breastfed at the discharge time (t0), 270 women answered the telephonic interview at t1. Among the 228 women who breastfed at three months (t1) postpartum, 218 completed the telephonic interview at six months

(t2). We identified no determining factors of loss to follow-up among the 24 not responding women at t1 and the 10 not responding women at t2. Table 1 presents the participants characteristics.

	t0	t1	t2
	(n=298)	(n=270)	(n=218)
	n (%)	n (%)	n (%)
Breastfeeding			
No	4 (1.34)	42 (15.56)	35 (16.06)
Yes	294 (98.66)	228 (84.44)	183 (83.94)
Feeding practice			
Exclusive breastfeeding	224 (75.17)	177 (65.56)	29 (13.30)
Predominant breastfeeding	7 (2.35)	0 (0.00)	0 (0.00)
Complementary feeding	63 (21.14)	51 (18.89)	154 (70.64)
No breastfeeding	4 (1.34)	42 (15.56)	35 (16.06)
Parity			
Nulliparous	163 (54.60)	143 (52.96)	108 (49.54)
Multiparous	135 (45.30)	127 (47.04)	110 (50.46)
Group antenatal education			
No	185 (62.08)	166 (61.48)	135 (61.93)
Yes	113 (37.92)	104 (38.52)	83 (38.07)
Group antenatal education among nulliparous women			
No	57 (19.13)	45 (16.67)	29 (13.30)
Yes	106 (35.57)	98 (36.30)	79 (36.24)
Group antenatal education among multiparous women			
No	128 (42.95)	121 (44.81)	106 (48.62)
Yes	7 (2.35)	6 (2.22)	4 (1.83)
Group antenatal education during previous pregnancies			
No	63 (21.14)	56 (20.74)	47 (21.56)
Yes	72 (24.16)	71 (26.30)	63 (28.90)
Labour analgesia or anaesthesia			
Epidural analgesia	31 (10.40)	27 (10.00)	19 (8.72)
Spinal anaesthesia	72 (24.16)	65 (24.07)	51 (23.39)
General anaesthesia	15 (5.03)	14 (5.19)	8 (3.67)
No	180 (60.40)	164 (60.74)	140 (64.22)
Mode of birth			

Vaginal birth	212 (71.14)	192 (71.11)	159 (72.94)
Caesarean section	84 (28.19)	78 (28.89)	59 (27.06)
Skin-to-skin contact			
Early (0-2 hours)	249 (83.56)	226 (83.70)	189 (86.70)
Delayed (>2 hours)	45 (15.10)	44 (16.30)	29 (13.30)
Missing data	4 (1.34)	0 (0.00)	0 (0.00)
Individual antenatal breastfeeding education			
No	77 (25.84)	72 (26.67)	64 (29.36)
Yes	221 (74.16)	198 (73.33)	154 (70.64)
Support for breastfeeding during the first 3 months postpartum			
No	-	196 (72.59)	154 (70.64)
Yes	-	74 (27.41)	64 (29.36)
Previous smoking habits			
No	168 (56.38)	154 (57.04)	126 (48.46)
Yes	130 (43.62)	116 (42.96)	92 (35.38)
Smoking status			
Never-smoker	168 (56.38)	154 (57.04)	126 (57.80)
Former smoker	104 (34.90)	91 (33.70)	67 (30.73)
Current smoker	26 (8.72)	25 (9.26)	25 (11.47)

Table 1: Descriptive statistics of mothers at discharge (t0), at three months postpartum (t1) and at six months postpartum (t2).

The majority of participating women were nulliparous (54.60%), did not participate in antenatal group education (62.08%) and gave birth naturally (71.14%) without labour analgesia or anaesthesia (60.40%). The prevalence of any BF was 98.66% at t0, 84.44% at t1 and 83.94% at t2. The prevalence of exclusive BF was 75.17% at t0 and 65.56% at t1.

Focusing on the smoking habits, the 56.38% of the mothers were never-smokers, the 34.90% former smoker and the 8.72% current smokers. Among ever-smoker, 41 (31.54%) women ceased smoking before the pregnancy and 63 (48.46%) women during pregnancy, while no smoking cessation was registered for 26 (20.00%) mothers. Of the 25 (9.26%) current smokers at t1, 19 women did not cease smoking during pregnancy, whereas smoking relapse during the first three months postpartum was reported for 6 women. Table 2 presents the characteristics of ever-smoker mothers at discharge, at t1 and at t2. Among the 25 (11.47%) current smokers at t2, 12 women did not cease smoking during pregnancy, while 5 and 8 women reported smoking relapse at t1 and t2, respectively.

	t0	t1	t2
	(n=130)	(n=116)	(n=92)
	n (%)	n (%)	n (%)
Promotion of smoking cessation			
No	0 (0.00)	2 (1.72)	1 (1.09)
Yes	130 (100.00)	114 (98.28)	91 (98.91)
Smoking cessation			
No	26 (20.00)	19 (16.38)	12 (13.04)
During pregnancy	63 (48.46)	60 (51.72)	60 (65.22)
Before pregnancy	41 (31.54)	37 (31.90)	20 (21.74)
Smoking relapse			
1-3 months postpartum	-	6 (5.17)	5 (5.43)
4-6 months postpartum	-	-	8 (8.70)

Smoking during pregnancy	26 (20.00)	19 (16.38)	12 (13.04)
No smoking during pregnancy	104 (80.00)	91 (78.45)	67 (72.83)

Table 2: Descriptive characteristics of ever-smoker mothers at discharge (t0), at three months postpartum (t1) and at six months postpartum (t2).

Factors associated with BF at three and six months

Table 3 presents the results of bivariate analysis investigating the possible determinants of BF. Participation in antenatal group education increased the likelihood of BF at t1 of the 92.3% compared with women who never received any antenatal group education. Other factors positively associated with any BF at three months were no labour analgesia/anaesthesia (OR 2.271; 95% CI:

1.202, 4.290), early skin-to-skin contact (OR 3.267; 95% CI: 1.615, 6.618), and support for BF during the first three months postpartum (OR 5.879; 95% CI: 1.862, 18.843). Exclusive BF showed a significantly positive association with the previous determining factors: participation in antenatal group education (OR 2.000; 95% CI: 1.054, 3.798), no labour analgesia/anaesthesia (OR 2.872; 95% CI: 1.501, 5.494), early skin-to-skin contact (OR 4.017; 95% CI: 1.950, 8.288), and support for BF during the first three months postpartum (OR 3.946; 95% CI: 1.394, 11.110). Furthermore, women giving birth naturally were 2.329 times more likely to exclusive breastfeed, compared to those who had a Caesarean section (OR 2.329; 95% CI: 1.161, 4.618). In our analysis, any BF at six months was significantly associated with multiparity (OR 2.778; 95% CI: 1.144, 6.724) and support for BF during the first three months postpartum (OR 2.645; 95% CI: 1.311, 5.327).

	Any BF [§] at t1	Exclusive BF at t1	Any BF at t2
	OR (95% CI)	OR (95% CI)	OR (95% CI)
Multiparity	1.647 (0.863, 3.140)	1.844 (0.958, 3.546)	2.778 (1.144, 6.724)
Ever attending group antenatal education	1.923 (1.021, 3.624)	2.000 (1.054, 3.798)	1.552 (0.908, 2.656)
Individual antenatal breastfeeding education	0.712 (0.297, 1.575)	0.958 (0.450, 1.964)	0.931 (0.431, 1.565)
No labour analgesia/anaesthesia	2.271 (1.202, 4.290)	2.872 (1.501, 5.494)	1.345 (0.789, 2.293)
Vaginal birth	1.684 (0.815, 3.405)	2.329 (1.161, 4.618)	1.198 (0.643, 2.201)
Early skin-to-skin contact	3.267 (1.615, 6.618)	4.017 (1.950, 8.288)	1.865 (0.958, 3.636)
Support for breastfeeding during the first 3 months postpartum	5.879 (1.862, 18.843)	3.946 (1.394, 11.110)	2.645 (1.311, 5.327)
Note: [§] BF: Breastfeeding			

Table 3: Factors associated with breastfeeding at three months postpartum (t1) and six months postpartum (t2).

Smoking as determinant of BF at three and six months

Our analyses showed a significant association between no smoking at childbirth and any BF at t1 (RR 1.705; 95% CI: 1.242, 2.341) and at t2 (RR 2.857; 95% CI: 1.763, 4.631). Non-smokers were more likely to continue any BF at six months (RR 1.351; 95% CI: 1.002, 1.822). Finally, we found no significant association between smoking habits and exclusive BF. The findings are shown in Table 4.

	Any BF [§] at t1	Exclusive BF at t1	Any BF at t2
	RR (95% CI)	RR (95% CI)	RR (95% CI)
Previous smoking habits	1.018 (0.914, 1.135)	1.071 (0.929, 1.235)	1.151 (0.974, 1.361)
No smoking at childbirth	1.705 (1.242, 2.341)	1.206 (0.856, 1.699)	2.857 (1.763, 4.631)
No smoking at the third month postpartum	1.122 (0.895, 1.408)	1.192 (0.872, 1.630)	1.351 (1.002, 1.822)
Note: [§] BF: Breast Feeding			

Table 4: Smoking as determinant of breastfeeding at three months postpartum (t1) and at six months postpartum (t2).

Discussion

The aim of our study is to determine the association of individual and perinatal healthcare factors with feeding practices, BF prevalence and BF duration. In our study, any BF and exclusive BF at three months postpartum are strongly related to antenatal group education, no labour analgesia, early skin-to-skin contact and support for BF during the first three months postpartum. Moreover, exclusive BF at three months postpartum is associated to vaginal birth. The only two factors associated to BF at six months postpartum are antenatal group education and support for BF during the first three months postpartum. Our analysis shows that antenatal group education increased the probability of any BF and exclusive BF at three months postpartum, in accordance with previous evidence [12].

In Umbria, antenatal group education is intended to provide information about pregnancy, childbirth and BF and to promote healthy behaviours during pregnancy and postpartum. Our results suggest that the antenatal group education could benefit mothers promoting BF, even though the attendance to antenatal group education could also reflect a stronger motivation to breastfeed. According to literature, there is no conclusive evidence supporting that any antenatal BF education improves initiation or duration of any BF [13].

The role of labour anaesthesia in predicting BF initiation and duration remains controversial [14], while evidence shows a negative association with BF exclusivity [15]. In our study, we found an increased probability of any BF at three months and exclusive BF at three months postpartum among mothers not receiving labour analgesia or anaesthesia. In our sample, this association could be affected by possible confounders, such as Caesarean section and delayed skin-to-skin contact. Moreover, evidence reports that labour analgesia and labour drugs have an independent effect on infant suckling [16-18]. Maternal analgesia has been reported to affect the infant's massage-like hand movements on the breast, the hand-to-mouth movements, and the touching of the areola and nipple with hands [17].

Our analyses show a positive association between vaginal birth and exclusive BF at three months postpartum, while we found no significant association with any BF at three or six months postpartum. In accordance with the evidence, Caesarean section affects exclusive BF at three months [19] but shows no impact on BF at six months [20].

The recently released WHO Baby-Friendly Clinical Guidance [21] recommends to facilitate an early and uninterrupted skin-to-skin contact and to encourage and support mothers to breastfeed as soon as possible after birth. The uninterrupted skin-to-skin contact should continue for at least one hour or until after the first breastfeed. Early skin-to-skin contact is important not

only for the establishment of BF, but it also plays a relevant role in infant and child survival development [1]. Early skin-to-skin contact enhances the mother's BF self-efficacy [22] and increases the probability of exclusive BF [23]. According to literature, early skin-to-skin contact is likely to improve BF outcomes both after a vaginal birth [24] and after a Caesarean section [25,26]. In our study, early skin-to-skin contact shows a significantly positive association with any BF at three months postpartum, particularly exclusive BF.

We found that healthcare professionals and/or families support for BF during the first three months postpartum significantly increases the likelihood of any BF at three months, exclusive BF at three months and any BF at six months postpartum. Support for BF during the postpartum period represents an effective intervention in increasing BF rates and duration [27]. Evidence-based interventions include maternity care practices, support for BF in the workplace, peer support, and professional support [28]. The first three months postpartum represents a crucial period for additional interventions and support for BF, as many mothers return to work after the pregnancy leave. Indeed, return to work is related to a shorter duration of BF and mothers who intend to work full time show significantly lower rates of BF initiation and shorter duration [29]. Furthermore, the first few weeks after giving birth are a critical period during which professional support assumes great relevance [30]. Mothers perceived the support received from health care providers as one of the most important factors to help them breastfeed [31]. Thus, the lack of professional support represents a barrier to BF [32,33]. Peer support programs are independent predictor of BF initiation and duration [34]. Social networks influence mothers decision-making processes and feeding practices [35]. Obstetrician-gynaecologists and other obstetric care providers should support mothers to initiate and continue BF [36], but support for BF is recommended to be offered by any trained health care professional, especially during the first days and weeks postpartum [1].

The relation between maternal smoking and BF

A crucial modifiable determinant of BF and early weaning is maternal smoking [37,38]. A powerful finding from the current study is the association between smoking and failure to continue BF. While BF decreases during the period in study, maternal smoking relapse increases. A history of maternal smoking was not significantly associated with any of the BF outcomes. Mothers not smoking at childbirth are more likely to breastfeed at any time and mothers not smoking at three months postpartum are more likely to breastfeed at six months postpartum. No association was found between exclusive BF and smoking habits at childbirth and at three months postpartum. Many studies report the link between maternal smoking and BF cessation [39-43]. Mothers who quit smoking during pregnancy are more likely to initiate BF [44]. Moreover,

early weaning is strongly associated with perinatal smoking. Early postpartum smoking relapse has been demonstrated to reduce the likelihood of BF initiation and duration [45]. This behaviour could be explained by mothers' perception of smoking as a barrier to BF. Early weaning could be related to the fear of toxic effects of nicotine and other substances in the milk on the infants [46]. Maternal perception of insufficient milk supply is a common cause of BF cessation [47] and, according to literature, smoking mothers tend to perceive the milk production as insufficient [44]. Even though women should be counselled to quit smoking and supported during pregnancy and postpartum to avoid relapse, mothers unable to quit smoke should be encouraged to continue BF while trying to reduce their smoking [48,49].

Further studies are needed to fully exploit the determinants of the feeding practices and the role of smoking in BF initiation and duration. Future efforts should be targeted on training and educating health care providers, encouraging BF at childbirth and postpartum, fostering the establishment and implementation BF professional and peer groups, and reducing maternal smoking and preventing relapses.

Limitations

One of the main limitations of this study is the size of our sample. Future studies will investigate the prevalence and determinants of BF in the short-term and long-term in the other hospitals of our region. As smoking status and habits could reflect social status, educational level and income, another important limitation of our study is the lack of information on maternal race, educational level, and income. No adjustments on individual characteristics or structural determinants have been performed.

Conclusions

Our findings reflect the complexity of infant feeding process and suggest a list of factors of antenatal and postnatal care in which there is potential for further focused evidence-based interventions to promote and support BF initiation and continuation. These interventions provide professional and social support, assuming relevance in both antenatal and postnatal care. Group antenatal education and support during the first three months postpartum are important determinants of BF at three and six months. Maternal smoking affects BF outcomes and should be strongly discouraged during and after pregnancy. Particular attention should be paid when counselling smoking mothers in order to clarify the beneficial effects of maternal milk.

Ethical Approval

The research was validated by the Council of the Obstetrics Degree Course of the University of Perugia. The research protocol was approved by Hospital Directorate of the Perugia Teaching Hospital which authorized data collection. After the verbal

informed consent process, all participants assured their consent to data collection and use. Participation was entirely on a voluntary basis and participants could withdraw from the study at any time. No participation incentive was provided.

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