

Factors Contributing to Non-Exclusive Breastfeeding in Primigravid Mothers

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Abstract

Aims

We aimed to examine the factors contributing to non-exclusive breastfeeding in primigravid mothers in a large Irish tertiary maternity hospital.

Methods

This was a retrospective cohort study carried out at the Rotunda Hospital, Dublin, Ireland. Maternal demographics, antenatal, perinatal, delivery-related information and neonatal outcomes were collected and analysed.

Results

569 eligible mothers were delivered during the study period. Out of the 416 mothers intending to breastfeed, 278 (67%) mothers were exclusively breastfeeding at discharge. On univariate analysis, a higher body mass index, unemployment, an Asian background, gestational diabetes, antenatal steroids, low birth weight and hypernatremia were all associated with non-exclusive breastfeeding (all $p < 0.05$). On logistic regression, only gestational diabetes, a birthweight < 2500 grams and hypernatremia remained significantly associated with non-exclusive breastfeeding on discharge.

Conclusion

Addressing barriers to breast feeding through antenatal and early neonatal education, counselling and support, by qualified healthcare personnel may increase the number of infants exclusively breastfeeding on discharge.

List of Abbreviations:

BFHI: Baby-Friendly Hospital Initiative

NICU: neonatal intensive care unit

BMI: body mass index

PIH: pregnancy-induced hypertension

APH: antepartum haemorrhage

PPH: postpartum haemorrhage

SD: standard deviation

OR: odds ratio

BF: breastfeeding

PROM: prolonged rupture of membranes

Introduction

Exclusive breastfeeding for the first 6 months is recommended to support the infants' nutritional needs, immature immune system, and leads to a reduction of important short and long-term morbidities¹. In addition, breastfeeding has a protective role for mothers by reducing the risk of certain diseases including breast and ovarian cancer^{2,3}, osteoporosis⁴, and type 2 diabetes⁵. Furthermore, it helps to maintain the special bond between a mother and her infant which leads to less negative emotional and psychological issues related to parenting.

The recently revised Baby-Friendly Hospital Initiative (BFHI) by United Nations International Children's Emergency Fund (UNICEF) aims to further support facilities providing maternity and newborn care to implement Ten Steps to Successful Breastfeeding further emphasises the importance of limiting the use of human milk substitutes. They also highlight the importance of ongoing monitoring of the success of this initiative. The rate of exclusive breastfeeding on hospital discharge in the Republic of Ireland, although slightly improving, remains significantly lower than the European average (48% vs 80% in 2017). The introduction of formula supplements during the initial hospital stay remains relatively common in the Irish setting and is triggered by a variety of reasons that to date, have not been clearly defined. Introduction of supplementation with infant formula during the initial hospital stay can result in a significant reduction in breastfeeding rates at 3, 6 and 12 months⁶.

In this retrospective cohort study, we aimed to examine the factors contributing to non-exclusive breastfeeding at discharge in primigravid mothers with healthy singleton deliveries who are fully intending to breastfeed in a large Irish tertiary maternity hospital. We aim to identify those factors in-order devise a management plan to further support those mothers. We hypothesise that certain antenatal, perinatal and neonatal factors can increase the risk of non-exclusive breastfeeding in this cohort.

Methods

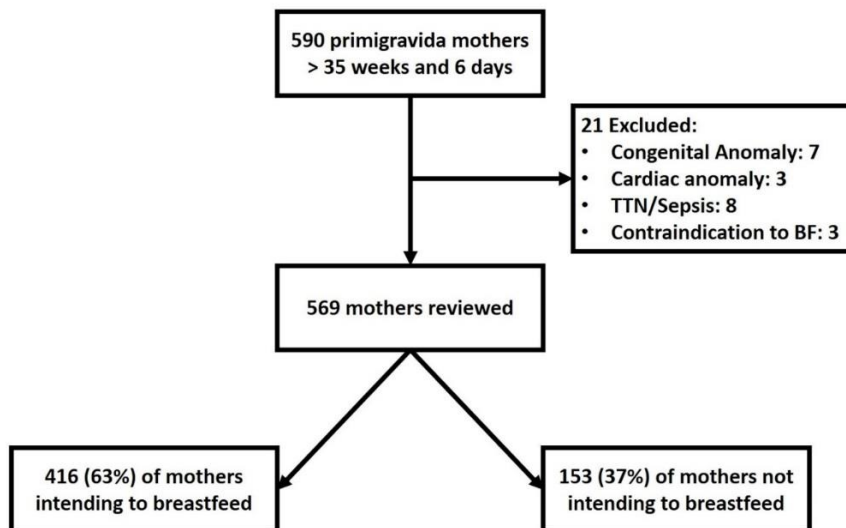
This was a retrospective cohort study. An electronic health care record was launched in November, 2017 from which data was abstracted. Ethical approval was obtained from our local Research Ethics Board for the retrospective review of data from our electronic charting system. This study was carried out at the Rotunda Hospital, Dublin, Ireland: a stand-alone tertiary maternity hospital with an annual birth rate of 8500 deliveries. Data were collected over a two-month period: December 2017 and January 2018. We included primigravida mothers with a singleton delivery born at or after 36 weeks and 0 days gestation who delivered a live healthy infant. Infants with congenital anomalies, congenital heart disease, contra-indications to breastfeeding, and infants admitted to the neonatal intensive care unit (NICU) were excluded. Mothers not intending to breastfeed for non-medical reasons were included in the preliminary analysis but excluded from the detailed analysis.

Maternal demographics including age, weight (and body mass index, BMI), ethnicity, employment, smoking and alcohol intake, and healthcare cover were collected. Important antenatal and perinatal clinical information was also collected and included co-morbidities such as pre-eclampsia, hypothyroidism, pregnancy-induced hypertension (PIH), prolonged rupture of membranes (PROM), antepartum (APH) and postpartum (PPH) haemorrhage. We collected information on delivery-related interventions including the use of oxytocin, epidural analgesia, cesarean delivery and the use of antenatal steroids. Neonatal outcomes collected included gestation and weight at birth, gender, cord pH, 5 minute Apgar score, time to first breastfeed, weight loss during hospital stay, development of jaundice requiring photo therapy, hypoglycaemia (defined as blood glucose < 2.6 mmol/L), and hypernatremia (defined as a serum sodium > 145 mmol/L).

Continuous variables were presented as means \pm standard deviation (SD) or medians [inter-quartile range] as appropriate. Categorical variables were presented as counts (%). Two group analyses of continuous variables were conducted using the student t-test or the Mann-Whitney U test as appropriate. Categorical variables were compared using the Chi square test of Fisher exact test. Logistic regression was performed to assess the independent effect of important predictor variables on exclusive breastfeeding at discharge. A p value < 0.05 was considered significant. SPSS (IBM, version 23) was used to conduct the analysis.

Results

Five hundred and ninety potentially eligible mothers delivered during the study period. Twenty-one were excluded for the following reasons: 7 with a congenital anomaly; 3 with congenital heart disease; 3 with contraindications to breastfeeding; and 8 with transient tachypnoea of the newborn or sepsis necessitating NICU admission. Five hundred and sixty-nine charts were examined: 153 (37%) mothers did not intend to breastfeed; 416 mothers intended to breastfeed and were examined in greater detail (**Figure 1**).



Mothers intending to breast feed were older and more likely to be employed when compared to mothers with no intention to breastfeed. There were no differences in infant gestation, birthweight, maternal weight or delivery methods (**Table 1**).

Table 1: Demographics and mode of delivery in mothers intending and not intending to breast feed.

	Intention to Breast Feed n=416	No Intention to Breast Feed n= 153	p
Maternal Age (years)	31 ± 6	28 ± 7	<0.01
Maternal weight (Kg)	70 ± 14	71 ± 16	0.12
Maternal BMI			
< 18	2 (1)	2 (1)	
18-25	264 (63)	86 (56)	
25 - 30	107 (26)	48 (32)	0.33
> 30	43 (10)	17 (11)	
Gestation (weeks)	39.4 ± 1.2	39.5 ± 1.3	0.36
Birthweight (grams)	3429 ± 460	3403 ± 522	0.57
Employed	365 (88%)	114 (75%)	<0.01
Delivery Method			
<i>Spontaneous Vaginal</i>	151 (36)	58 (38)	
<i>Instrumental Vaginal</i>	143 (34)	47 (30)	
<i>Cesarean Delivery</i>	122 (29)	48 (32)	0.71

Values are presented as mean ± SD or count (%).

Out of the 416 mothers intending to breastfeed, 278 (67%) mothers were exclusively breastfeeding at hospital discharge. This gives an overall exclusive breastfeeding on discharge rate of 49% in the entire cohort (278/569). Table 2 demonstrates maternal demographics, antenatal and perinatal factors between the two groups. Mothers who were not exclusively breastfeeding at discharge had a higher BMI, a lower rate of employment, were more likely to be from an Asian background, had a higher incidence of gestational diabetes and were more likely to receive antenatal steroids (all $p < 0.05$, **Table 2**). There was a trend towards a lower rate of cesarean delivery in mothers exclusively breastfeeding on discharge ($p = 0.05$, **Table 2**).

Table 2: Maternal Demographics and Antenatal / Perinatal Factors between the Two Groups.

	Exclusive Breastfeeding n=278 M (SD)	Human milk and/or formula n=138 M (SD)	p
Maternal Age (years)	31 ± 5	31 ± 6	0.72
Estimated blood loss (mL)	400 ± 230	410 ± 200	0.65
Body Mass Index > 30	21 (8)	22 (16)	0.01
Ethnicity			
Caucasian	232 (83)	109 (79)	
African	7 (3)	3 (2)	
Asian	12 (4)	21 (15)	<0.01
Other	27 (10)	5 (4)	
Private Healthcare	48 (17)	30 (22)	0.29
Employed	251 (90)	114 (83)	0.04
Smoking	10 (4)	6 (4)	0.79
Pre-eclampsia	9 (3)	8 (6)	0.30
Hypothyroidism	23 (8)	11 (8)	1.00
Pregnancy-Induced Hypertension	20 (7)	5 (4)	0.19
Gestational Diabetes	9 (3)	22 (16)	<0.01
Prolonged Rupture of Membranes	20 (7)	6 (4)	0.29
Antepartum Hemorrhage	5 (2)	4 (3)	0.49
Postpartum Hemorrhage	18 (7)	5 (4)	0.26
Oxytocin Use	183 (66)	97 (70)	0.38
Epidural Analgesia	194 (70)	103 (75)	0.36
Cesarean delivery	73 (26)	49 (36)	0.05
Antenatal Steroids	2 (1)	5 (4)	0.04

Values are presented as mean ± SD or count (%).

There were no differences in any of the other variables between the two groups including the use of epidural analgesia, and time to first breastfeed. There were no reported cases of alcohol intake during pregnancy in either group. There were no differences in gestation or birthweight between the two groups. There was a higher rate of low-birth-weight infants in the mothers not exclusively breastfeeding on discharge (**Table 3**). There was a lower rate of weight loss on day 2 and by hospital discharge in mothers not exclusively breastfeeding (**Table 3**). Hypoglycaemia and hypernatremia were commoner in the non-exclusive breastfeeding groups (**Table 3**).

Table 3: Birth and Neonatal Characteristics between the Two Groups.

	Exclusive Breastfeeding n=278	Breast milk and/or formula n=138	p
Gestation	39.5 ± 1.2	39.4 ± 1.1	0.77
Birthweight	3436 ± 451	3414 ± 480	0.64
Female	141 (50)	72 (52)	0.83
Cord pH	7.30 ± 0.07	7.30 ± 0.08	0.53
Percentage weight loss Day 3	-6.1 ± 3.5	-4.4 ± 3.5	<0.01
Percentage weight loss Discharge	-5.8 ± 3.1	-3.8 ± 3.5	<0.01
Highest Sodium (mmol/L)	149 ± 3	148 ± 3	0.49
Highest Bilirubin (mmol/L)	173 ± 56	220 ± 44	<0.01
Five Minute Apgar Score	10 [10 – 10]	10 [10 – 10]	0.81
Time to First Breast Feed (min)	50 [33 – 68]	48 [36 – 63]	0.92
Proportion < 2500 grams	2 (1)	6 (4)	0.02
7% weight loss on Day 2	95 (34)	33 (24)	0.04
10% weight loss on Discharge	6 (2)	3 (2)	1.00
Jaundice requiring Phototherapy	4 (1)	6 (4)	0.09
Hypoglycaemia	6 (2)	14 (10)	<0.01
Hypernatremia	5 (2)	9 (7)	0.02

Values are presented as mean ± SD, median [IQR] or count (%).

Time to first breastfeeding information was available for 318. Overall, 214 (67%) of women achieve a first breastfeed within 1 hours following birth. Time to first breastfeed was shorter in mothers following cesarean section when compared to vaginal birth (41 [21 – 54] vs. 52 [35 – 58] minutes, $p < 0.001$). A higher proportion of mothers undergoing cesarean section achieved a first breast feed within the first hour after birth (56/65, 86%) when compared to mothers delivering vaginally (158/253, 63%, $p < 0.001$).

A logistic regression model was constructed to assess the independent effect of important variables on exclusive breastfeeding at discharge. The model included the following predictor variables: BMI > 30, ethnicity, gestational diabetes, cesarean section, antenatal steroids, employment, time to first breastfeed, birthweight < 2500 grams, and hypernatremia. Only gestational diabetes (OR 0.19, 95% CI 0.08 – 0.45), a birthweight less than 2500 grams (OR 0.13, 95% CI 0.02 – 0.67) and hypernatremia (OR 0.30, 95% CI 0.09 – 0.97) remained significantly associated with non-exclusive breastfeeding on discharge.

Discussion

We demonstrated that only 63% of primigravid mothers have an intention to breastfeed at birth. Those mothers tended to be older and were more likely to be in employment. One third of those mothers were discharged from the hospital on formula supplements. Data from the National Perinatal Reporting System in 2015 illustrate that 58% of babies in the Republic of Ireland were receiving any human milk on discharge from hospital and 48% were breastfed exclusively. Our study has demonstrated a similar rate of exclusive breastfeeding on discharge of 48% with 73% receiving any human milk. Although the rate of mothers providing any human milk has improved, the rate of exclusive breastfeeding remains well below the European average of 80%. This highlights the importance of identifying factors leading to the introduction of formula supplementation in our hospital setting taking into account important neonatal factors as well as maternal factors.

On univariate analysis we identified important maternal characteristics that were associated with the introduction of formula feeding. Those included a higher BMI, Asian ethnicity, the presence of gestational diabetes, cesarean section and the use of antenatal steroids. Interestingly the use of epidural analgesia was not associated with a reduction in exclusive breastfeeding rates⁷. There is some data in the literature implicating the use of antenatal steroids on human milk production postnatally albeit in the preterm population⁸. This association requires further study in the late preterm and early term populations. Maternal obesity can delay lactogenesis due to lower prolactin levels in response to suckling⁹. Diabetic women also exhibit lower levels of colostral-specific metabolites within 72 hours of delivery, indicating delayed secretory activation and suggesting a biological link between with lower exclusive breastfeeding rates and gestational diabetes¹⁰.

Woman delivering vaginally are more likely to initiate breastfeeding when compared to women delivered by Cesarean section, especially without labour activity¹¹. Woman enrolled in our study were more likely to breastfeed exclusively following vaginal delivery as well, even though, infants delivered by cesarean section are not separated from their mothers, and have an opportunity to initiate first breastfeed early. In fact, in our hospital, time to first breast feed was shorter in babies delivered via cesarean section when compared to vaginal deliveries with more achieving the “within one hour” target. There are number of other reasons that could lead to the lower rate of exclusive breastfeeding after cesarean birth, such as pain, reduced mobility, lack of confidence of the ability to provide part of the natural care of the infant, especially after failed vaginal delivery.

Weight loss in the first days of life has been the subject of many studies before. It is important to monitor weight gain in the neonatal period, as excessive weight loss can be associated with significant consequences such as hypernatremia dehydration or severe hyperbilirubinemia¹². Our study showed that there is a higher weight loss in the group of neonates who were exclusively breastfed. However, this (on average) did not fall below the 7% mark; significant weight loss ($\geq 7\%$) was observed in non-exclusively breastfed babies and this was likely the trigger for introducing formula feeds in this subgroup.

The presence of hypoglycaemia in neonates, symptomatic and asymptomatic, can be associated with a brain injury and subsequent poor neurological outcome¹³. Our findings show that there was a higher rate of hypoglycaemia in non-exclusively breastfed new-borns, explaining the reason for formula supplementation as a method of treating hypoglycaemic condition. Although, there was a higher incidence of supplementation in a group of smaller babies, as

well as babies born to obese mothers and those with gestational diabetes, contributing to the assumption that these factors have more significant impact of developing hypoglycaemia, than feeding type alone.

This study is limited by the usual caveats associated with a retrospective design. Potentially important maternal risk factors such as a history of infertility, polycystic ovarian syndrome and assisted reproduction was not available. Those factors may have affected the mothers' ability to breast feed. The reason for supplementation in infants born to mothers with gestational diabetes remains unclear from this study (hypoglycaemia versus low milk supply). The temporal association between neonatal morbidities and formula feeding is unclear from this study. Those issues need to be further investigated in a prospectively designed study. However, it is likely that formula feeding was instigated in response to (or to avoid the potential development of) hyponatremia, hypoglycaemia in at risk infants.

Our findings outline the importance of early recognition of woman-infant dyads at risk of breastfeeding challenges due to various maternal and neonatal factors. Addressing them by a combination of antenatal and early neonatal education, counselling and support, by qualified healthcare personnel may increase the number of infants exclusively breastfeeding on discharge.

Ethics Approval and Consent to Participate:

The Rotunda Hospital Research Ethics Committee approved the study: (Reference number RAG-2018-012). This was a retrospective study. Informed consent was waived.

Declaration Conflicts of Interest:

The authors declare that they have no competing interests.

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