

# Breast-feeding patterns and factors determining exclusive breast-feeding

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## ABSTRACT

**Introduction:** Breast-feeding is a major determinant of infants' health and survival. The aim of this study was to examine breast-feeding patterns and the role of some factors on exclusive breast-feeding.

**Methods:** The study was done at the Health Centre of Community Oriented Medical Education of Zanjan City, Iran. Mothers of 650 infants younger than one year of age were interviewed directly by healthcare providers. The necessary information was recorded on pre-structured questionnaires, and the feeding patterns of all infants were determined.

**Results:** The rate of breast-feeding was greater than 92 percent during the first year of life. Exclusive breast-feeding rate in the first five days of life was 82 percent, but it declined to 44 percent at the first month. The chance of exclusive breast-feeding was higher in infants who were on demand feeding (odds ratio [OR] 2.6), breastfed more than eight times per day (OR 2.23), and their birth weight ranged from 2.5 to 4 kg (OR 2.16). This chance was less among infants exposed to pacifiers (OR 2.62) and with the numbers of deliveries equal to or more than three (OR 2.25).

**Conclusion:** The rates of breast-feeding initiation and its duration at six and 12 months were higher than the national goal. The rate of exclusive breast-feeding was nearly 44 percent. It seems necessary to elucidate the role of other factors, such as socioeconomic status, on exclusive breast-feeding.

**Keywords:** breast-feeding, exclusive breast-feeding, infant health

*Singapore Med J 2008;49(12):1002-1006*

## INTRODUCTION

The benefits of breast-feeding (BF) to both the infants and the mothers are now evident.<sup>(1-3)</sup> Extensive research, especially in recent years, has proven that BF reduces the morbidity and mortality of infants and children, and promotes maternal health, both in developing and developed countries.<sup>(4,7)</sup> BF prevents some bacterial infections, such as diarrhoeal disease, urinary tract infections, upper and lower respiratory tract, as well as bacteraemia and meningitis. It also reduces certain immunological disorders, such as atopic eczema, food and respiratory allergy, and also the risk of chronic disorders later in life, such as Crohn's and coeliac diseases, childhood cancers and diabetes mellitus. BF promotes mother-infant interaction and bonding, and it can also decrease postpartum bleeding, an earlier return to pre-pregnancy weight, delayed resumption of ovulation (which results in increased child spacing), and a possibly reduced risk of ovarian and breast cancers.<sup>(4,7)</sup>

In the early 1970s, the prevalence of BF declined in the world.<sup>(5)</sup> After 1990, the BF initiation rates have increased, while exclusive BF (EBF) rates have shown little or no increase.<sup>(6)</sup> In 2001, the World Health Organisation suggested that EBF should be continued until six months in developed and developing countries.<sup>(7)</sup> It seems that the major challenge in BF is the duration of BF rather than its initiation.<sup>(7)</sup> The aims of the current study were to investigate BF patterns, and to determine the role and value of some factors that may have positive or negative effects on EBF rates.

## METHODS

The study was conducted from May 2004 to February 2005 in the Health Centre of Community Oriented Medical Education of Zanjan University of Medical Sciences. This health centre serves 38,541 people and is located in Zanjan, a city in the centre of the Zanjan Province, north-west of Iran, with a population of nearly one million. The sample consisted of 650 infants under one year of age. The first year of life was classified into 13 age groups. 50 infants were studied in each group. Age from the time of birth up

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**Table I. Feeding status of infants (0–12 months).**

Age (months)	No. (%) of breast-fed infants	No. (%) of formula-fed infants	No. (%) of exclusively breast-fed infants	No. (%) of infants given supplementary fluids	No. (%) of infants fed on semisolids and solids
0	50 (100)	0	41 (82)	9 (18)	0
1	49 (98)	1 (2)	22 (44)	28 (56)	0
2	48 (96)	2 (4)	21 (42)	27 (54)	2
3	50 (100)	0	22 (44)	27 (54)	1
4	49 (98)	1 (2)	22 (44)	13 (26)	15 (30)
5	50 (100)	0	22 (44)	13 (26)	15 (30)
6	49 (98)	1 (2)	1 (2)	3 (6)	45 (90)
7	49 (98)	1 (2)	0	2 (4)	48 (96)
8	48 (96)	2 (4)	0	3 (6)	47 (94)
9	48 (96)	2 (4)	0	1 (2)	49 (48)
10	47 (94)	3 (6)	0	2 (4)	48 (96)
11	48 (96)	2 (4)	0	1 (2)	49 (98)
12	50 (100)	0	0	1 (2)	49 (98)

to five days of life was categorised as 0 month age group. Other groups were measured as  $\pm 5$  days before and after the related month; e.g. first month (second age group) was taken from 25 to 35 days of life, sixth month (seventh age group) included infants at 175–185 days of life, and eleventh month (twelfth age group) at 325–335 days of life.

Infants attended the health centre for their routine monthly health visits and/or their immunisation. Data was collected directly from their mothers. Gender, birth weight of the infants, number of children and deliveries, birth order of the infants, maternal ages, parents' employment and education, family income and the BF pattern were recorded by the healthcare providers. The interviews were conducted using a standardised, prestructured questionnaire. As studies on BF patterns based on recall may lead to recall bias, the current status analysis, which does not have recall bias and is able to show the exact feeding status,<sup>(5,9)</sup> especially EBF rates,<sup>(10)</sup> was used in the present study to gather information to provide high quality estimates of infant feeding patterns. The design of this study was a synthetic cohort based on the assumption that subjects of early cohorts will behave like those of late cohorts once the interval time between the former and the latter has elapsed.

EBF was defined as an infant's breast milk consumption with no supplementation of any type of food or drink (no water, no juice, no non-human milk and no solids), except for vitamins, minerals, and medications up to the age of six months. As soon as the infant received anything else other than breast milk, even a teaspoon of water, he/she was excluded from the EBF category. Partial BF was defined as BF the infant and supplementing his/her diet with other fluids or foods such as pre-lacteal, non-human milk, solid and semisolid foods.<sup>(11,12)</sup> Thus, breast-fed infants in this

study included those who were exclusively and partially breast-fed. Pre-lacteal feed denotes giving fluids (dextrose water, water or juice), and butter to the infants before their first time being breast-fed or during their first few days of life. BF pattern also included the number of feedings per 24 hours ( $< 8$  vs.  $> 8$  per day), demand feeding at day or night (according to the infants need, usually at 2–3 hour intervals), duration of each BF (on demand, i.e. the nipple release by the infant vs. the duration length; if it lasted 5–10 minutes or was ended by the mother), and the time interval between birth and the first time BF ( $< 1$  vs.  $> 1$  hour).

The purposes of this study were explained to all parents prior to obtaining their consent. The study procedures were approved and supported by an institutional review board of Zanjan University of Medical Sciences. Data was compiled and analysed using the Statistical Package for Social Sciences version 11.5 (SPSS Inc, Chicago, IL, USA). The data was arranged to show the median duration of BF, EBF, as well as the other kinds of food introduction such as pre-lacteal feeds, fluids, semisolids and solids. This gave the prevalence of BF, EBF and non-human milk feeding for each age group. Significant differences were evaluated using the chi-square test, odds ratio, and the 95% confidence intervals (CI). A p-value less than 0.05 was significant.

## RESULTS

All 650 questionnaires were completed by healthcare providers. The mean age of mothers was  $26.9 \pm 5.84$  years. Caesarean sections numbered 195 (30%). There were nine preterm deliveries (1.4%), seven twin pregnancies (1.1%), and two home deliveries (0.3%). BF was maintained at a high level, more than 92% for the first 12 months of life. Rate of EBF declined with age. The EBF rate at 0 months was 82%, but it sharply declined to 44% at one month. Through 1–5 months, 42%–44% of the infants were

**Table II. Factors influencing exclusive breastfeeding in 300 infants up to five months of age.**

Variables	No. of infants ≤ 5 months	No. (%) of EBF	p-value	Odds ratio (95% CI)
Pacifier users (and/or bottle feeding)			0.005	2.62 (1.31–5.2)
No	262	184 (70.0)		
Yes	38	18 (47.3)		
Duration of each breast-feeding			0.019	2.6 (1.14–6.16)
On demand	276	191 (69.2)		
5–10 minutes	24	11 (45.8)		
No. of deliveries			0.002	2.25 (1.35–3.75)
≤ 2	205	150 (73.2)		
≥ 3	95	52 (54.7)		
No. of feeds per day			0.016	2.23 (1.14–4.3)
> 8	252	179 (71.0)		
< 8	42	22 (53.2)		
Missing	6			
Birth weight (kg)			0.027	2.16 (1.08–4.34)
2.5–4	263	183 (69.6)		
< 2.5 or > 4	37	19 (51.4)		

exclusively breastfed (Table I). In our study, 15 (2.3%) mothers used infant formula feeding; none of them used cow's milk or pasteurised milk. Pre-lacteal feed was given by as many as 18% of the mothers in the first five days of life and included fluids (water, dextrose water, juice) and butter. At the age of seven months, 48% of the infants were receiving semisolids and solids. Table II shows the significant factors influencing EBF, although infants' gender, birth order, number of children, family income, parents' education and employment, mode of delivery, initiation of BF within one hour after birth, and on demand BF during the day and night, did not show any statistical difference with EBF. Maternal smoking, in our experience, was rare. Only one mother smoked during pregnancy and two smoked during lactation. Their infants were EBF for one month, two months and 11 months, respectively.

## DISCUSSION

This study provided the initiation rate of BF, its duration, and also the prevalence of EBF in infants aged 0–12 months. The results showed that more than 92% of infants were breastfed during their first year of life. The Healthy People 2010 goal was to achieve at least 75% of mothers BF their infants in the early postpartum period, and at least 50% and 25% of them continuing with BF until six months and 12 months, respectively.<sup>(2,8,13)</sup> In our study, the EBF rates were 82% in the first five days, but unfortunately declined to nearly 44% at one month and thereafter throughout the first five months of life.

The average EBF rate in the first five months in our study was 50% and the median duration of EBF was two months. In Tanzania, according to the National Bureau of Statistics (Tanzania) and Macro International Inc 2000, the median duration of BF was 21 months, whereas the median

duration of EBF was about one month.<sup>(14)</sup> In Bolivian infants, the median duration of BF was about 17 months and EBF was three months.<sup>(10)</sup> In Multan Hospital of Pakistan, the median duration of EBF was three months.<sup>(9)</sup> In Sweden, the six-month BF rate increased from 58% in 1992 to 72% in 2000.<sup>(15)</sup> In Switzerland, the median duration of 'any' BF was 31 weeks in 2003 compared with only 22 weeks in 1994.<sup>(15)</sup> Data from some countries has demonstrated that the major challenge is duration rather than initiation of BF. Table III summarises data on BF rates according to the study regions. According to the available information shown in this table, the major challenge of BF in some countries is EBF rates rather than BF initiation and duration.

There are many factors that influence BF duration. Some investigators suggested that BF difficulties rather than maternal choice led to early discontinuation of BF.<sup>(16)</sup> Others suggested that mothers' knowledge, attitudes and support were stronger determinants of BF duration than demographical, socioeconomical and biological factors.<sup>(14)</sup> We agree with the latter suggestion and speculate that an improvement in the mothers' attitudes and knowledge about the cost-effectiveness and health promotion of BF by healthcare providers, are the major determinants of BF duration.<sup>(18)</sup> We also recommend that family members, especially their husbands, support the mothers with BF difficulties.

The plan of this investigation was not to find out all the factors which would lengthen BF duration; rather, the role of some factors in BF was investigated. Our results indicate that EBF was related to the number of feedings per day, duration of each BF, no pacifier use (and/or bottle feeding), numbers of delivery, and birth weight. In agreement with another study which had shown that frequent, unrestricted, exclusive and effective BF are important factors for the

**Table III. Breast-feeding rates according to the study regions.**

Country of study	Initiation of breast-feeding (%)	Duration of breast-feeding (%)	Exclusive breast-feeding (months) (%)
Africa <sup>(14)</sup>		At 11 months: 90	At 6 months: 25
Austria <sup>(6)</sup>			At 1 months: 92 At 2 months: 85 At 6 months: 46
Bolivia <sup>(10)</sup>	100	At 3 months: 100 At 6 months: 93 At 12 months: 85	At 0.75 months: 75–85 At 2 months: 40 At 6 months: 20–25
Canada <sup>(16)</sup>		At 6 months: 30–40	
Denmark <sup>(6)</sup>			At 1 months: 73 At 2 months: 68 At 4 months: 44
Egypt <sup>(9)</sup>			At 4 months: 68
Germany <sup>(6)</sup>			At 2 months: 42 At 4 months: 33 At 6 months: 10
Delhi, India <sup>(5)</sup>	74		At 4 months: 46
Italy <sup>(7)</sup>	62–84		At 6 months: 19–23
Pakistan <sup>(9)</sup>		At 12 months: 88%	At 4 months: 66 At 6 months: 16
Saudi Arabia <sup>(9)</sup>			At 4 months: 55
Singapore <sup>(17)</sup>			At 1.5 months: 32 At 6 months: 13
Sweden <sup>(6)</sup>	100		At 2 months: 81 At 4 months: 69 At 6 months: 42
UK <sup>(6)</sup>	66		At 3.5 months: 50 At 6 months: 22–48
USA <sup>(1)</sup>	71.4	At 3 months: 51.5 At 6 months: 35.1 At 12 months: 16.1	At 3 months: 42.5 At 6 months: 13.3

establishment of normal lactation,<sup>(16)</sup> the results of our study showed that these factors are not only important for EBF, but they are also important for the continuation of BF. Using artificial nipples is believed to contribute to BF problems and early weaning,<sup>(19,20)</sup> but some investigators have failed to support a causal association between pacifiers and BF problems.<sup>(19)</sup> Exposure to milk formula and bottle feeding in the first two weeks are not recommended.<sup>(21)</sup> Studies in Brazil and the Philippines have shown lower rates of BF among babies with lower birth weights.<sup>(22)</sup> Our study showed that the prevalence of EBF is less in infants with birth weight < 2.5 kg or > 4 kg. This could be due to sucking problems encountered by low birth weight infants; however, the precise mechanism effecting less EBF for infants with high birth weight is still unclear.

In the current study, EBF was not related to the mother's age. Some studies showed that mothers > 25 years of age were more likely to initiate and continue BF in comparison with those who are younger.<sup>(12,16)</sup> Hruschka et al showed that in developing countries, caesarean deliveries had a negative effect,<sup>(12)</sup> and Daglas et al showed that natural deliveries had a positive effect on the duration of BF,<sup>(23)</sup> but our data did not show the effect of the mode of delivery on EBF. The influence of the timing of the first feeding on BF duration is

controversial.<sup>(16)</sup> Daglas et al reported that the initiation of BF, mainly within 1–6 hours after delivery, had a positive effect on BF,<sup>(23)</sup> but our results did not show this effect. This may be due to the different classifications of the initiation time of BF between the two studies. Some studies reported that heavy smoking has a negative effect on EBF<sup>(16)</sup> and on the duration of BF.<sup>(23)</sup> As we had only three smokers in this study, we could not consider the smoking effect on EBF and duration of BF.

BF is positively related to the socioeconomic status (household income, level of education, and/or occupation) in most developed countries, but there is an inverse relation in developing countries.<sup>(16)</sup> Some observations in developing countries suggested that mothers with a higher education level ended full BF earlier.<sup>(9,11)</sup> In the present research, EBF was not related to the parents' socioeconomic status. Limitations of our study included a lack of socioeconomic diversity in the study population, and further research is needed to confirm the generalisability of our socioeconomic results.

In conclusion, the rate of BF initiation in our study is greater than the Healthy People 2010 goal of 75%. The rates of BF duration at six and 12 months postpartum are still considerably higher than the goals of 50% and 25%,

respectively. The rate of EBF was nearly 44%. In total, we illustrated the role of some factors on initiation and continuation of BF. It seems necessary to elucidate the role of more factors that may have positive effects on EBF in order to improve the rate of EBF.

### ACKNOWLEDGEMENTS

We would like to thank Zanjan University of Medical Science for providing financial support, and the healthcare providers of the Health Centre of Community Oriented Medical Education for recording the data. We are grateful to Miss Elham Hosseini-nejad for her help on the editorial part.

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