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Barriers to Breast Feeding: A Review

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Context: Exclusive breast feeding, (EBF) protects young infants from infectious illnesses; various factors, including pacifier use, may adversely affect the initiation and duration of breast feeding.

Evidence Acquisition: Mesh terms relating to EBF were used to search articles published in PubMed between 2000 and 2014. In addition to studies done outside Iran, articles from Iran addressing the issue of pacifier use in infants that had not been published in the PubMed, but were collected from Iranian journals, were also included. Regarding pacifier use, search was limited to papers published during the last 5 years.

Results: Rates of breastfeeding at 6 months were reported to vary from 3% to 95% and EBF from less than 1% to 33% in different parts of the world. A negative association between pacifier use and duration of breastfeeding was reported by 10 authors, with a meta-analysis from Turkey reporting a Risk Ratio of 1.952, 95% CI: 1.662 - 2.293. Some researchers, although observed an association between pacifier use and early cessation of EBF, but refuted a causal relationship.

Conclusions: As available data on the effect of pacifier use is conflicting, and continuation of breast feeding till 6 months of age is crucial for optimal health outcomes in infants, it is prudent to avoid pacifier use totally or at least till breast feeding is established.

Keywords: Breast Feeding; Infant; Pacifier; Infections

1. Context

Breast milk has been recognized universally as the optimal nutrient for infants; a major advantage of breast feeding lies in the prevention of infection in exclusively breast-fed infants. Various factors, however, have an adverse effect on continuation of Exclusive Breast -Feeding (EBF) for the crucial first six months of an infant's life.

2. Evidence Acquisition

This paper is a review of studies that define the rate of breastfeeding in different parts of the globe and factors affecting the duration of EBF with a special focus about the role of pacifiers. The aim of this review is to determine if the use of pacifiers during the early weeks of life contributes to discontinuation of breast feeding before 6 months of age.

Methodology: Mesh terms, "breast feeding", "infant feeding", "pacifiers", "baby friendly hospital" were used to conduct the search in PubMed.

Inclusion criteria: All articles incorporating the stated Mesh terms, published from the year 2000 to 2014 were included for the initial review. Regarding pacifier use in infants we included papers published in or translated into English language during the last 5 years with access to full texts. In addition, we also included studies that we could find in our search engines about the role of pacifier use in Iranian infants.

Exclusion criteria: Papers about breastfeeding problems in preterm infants, babies with congenital anomalies, chronic diseases or hospitalization in the Neonatal Intensive Care Units or breastfeeding of adopted infants were excluded from the study.

Definitions: In this paper, methods of infant feeding are defined in accordance with the definitions recommended by the world health organization (WHO). Exclusive breast-feeding, is defined "as breastfeeding with no supplemental liquids or solid foods other than medications or vitamins or oral rehydration therapy". 'Predominant breastfeeding' happens when the infant receives no other milk except breast milk but is given water or other liquids like fruit juice or 'sugar water' in addition to breast milk. 'Partial breast feeding' is when the baby is given artificial feeds in addition to breast milk and "no breast feeding" is defined when the infant is fed totally on feeds other than breast milk (1-3).

3. Results

We reviewed 60 references; we included 49 of these with 38 full text articles and 11 abstracts about breastfeeding practices and the various factors affecting the rate of exclusive or predominant breast feeding during the early months of life. All except 1 reference were pub-

lished in the English Language or had been translated into English.

Patterns of infant feeding during the last decade were found to be widely variable in different parts of the world, (Table 1) (3-10). The rate of EBF as defined by the WHO is quite low in most countries; observations from robust studies have revealed that in several instances the term EBF has been misleading as infants that were described as receiving breast milk only were being "predominantly breast fed" (3, 11, 12). Moreover, studies have not found a significant difference in morbidity and mortality in EBF infants from predominantly breastfed babies (3).

A review of reports from most countries revealed that while breast feeding was started by the majority of mothers within a few hours of birth and ranged between 98% in a study from Iran to 91% in Ontario, 85.6% in Alberta, 87.5% in Hawaii and 82% in Italy, there was a continuing decline in EBF starting from the first postnatal month onwards (6, 8, 10, 13). Overall prevalence of breastfeeding was reported to be 86.4% from Isfahan in Iran, with 99% of all children ever been breast fed from Kenya and Uganda (4, 7, 9).

Rates of breast feeding at 6 months were reported to be > 85% from Kenya, 83% in Tehran, 70% from Italy, around 37% in Alberta, and about 23% in Ontario, Canada (6-10).

Several factors are associated with early discontinuation of breastfeeding or with commencement of complementary feeds sooner than the recommended period. These may be studied from different aspects viz., the reasons given by the parents for adding complementary feeds and also from objectively determining the association between different variables and early termination of EBF.

Early discontinuation of breast feeding may be based on maternal, neonatal or environmental reasons. Maternal issues include mother's age, marital status, occupation, parity, educational level, social and/or health status, multiple pregnancy, mode of delivery, perception of insufficient milk supply (6-10, 13-15), and problems related to the feeding process, for example inefficient 'latch', nipple pain etc. (13). Neonatal factors include babies' birth weight (10), neonatal hospitalization (8, 10), use of prelacteal feeds (7, 9, 16), and pacifier use (17-37). Mother-baby separation, pre- and post- natal support to the mother, cultural beliefs and traditional practices could be listed as environmental factors influencing the duration of breastfeeding (10, 16, 38). Hospital practices and training of health care personnel in accordance with the Baby friendly hospital initiative (BHFI), is another important variable that may have an enormous impact on the rate of EBF (39-44). Several of these factors may be interdependent, for example, delivery of low birth weight may result in neonatal hospitalization, mother-baby separation, and nonobservance to recommendations of BHFI (1, 10, 17, 24, 25, 39-44). Apart from health care settings, another potential confounder affecting infant feeding patterns in a community are the food-marketing strategies practiced by the multi-national baby formula companies, (the so-called infant food industry), and the degree of control exercised by government legislation on inappropriate formula advertising by these trade giants (45-47). The International Code for Marketing of Breast Milk Substitutes was drafted by the WHO and adopted by the world health assembly over 3 decades ago to restrict advertising of baby formula; however, violations of the Code are regularly practiced mainly because of lack of awareness among the health personnel about the articles specified in the code (46, 47).

Table 1. Prevalence of Exclusive Breast Feeding/ Predominant Breast Feeding as reported in Different Studies [a]

Authors	Year Published	Study Type	Location	Sample Size	Outcome Variable	Rate, %
Al-Sahab et al. (8)	2010	Observational	Canada	5,615	EBF at 6 mo	13.8
Bahl et al. (3)	2005	Multicenter RCT	India+ Ghana	6387	EBF 6 wk	21
			India+ Ghana	6160	EBF at 6 mo	3-4
			Peru	2315	EBF at 6 mo	33
Engebretsen et al. (9)	2007	Cross- sectional	Uganda	727	EBF at 3 mo	7
					EBF at 6 mo	0
					Pred. BF at 3 m	30
					Pred. BF at 6 mo	3
Charkazi et al. (4)	2013	Cross- sectional	Iran	406	Pred.BF at 6 mo	86.4
Kambale et al. (6)	2011		Italy	5812	BF initiation at birth	82
					BF at 6 mo	70
Olang et al. (5)	2012	Nation-wide survey	Iran	63071	BF at 6 mo	94.6

[a] Abbreviations: BF, breastfeeding; EBF, exclusive breast feeding; Pred. BF, predominant breastfeeding; RCT, Randomized controlled trial.

Some observational studies dealing with maternal factors affecting initiation and continuation of breast feeding revealed that mother's age, education or parity did not affect the rate of breast feeding (10), while others noticed that older age, higher maternal education and multi-parity were associated with higher likelihood of breast feeding at 6 months of age (6-8). On the other hand, maternal employment, cesarean delivery and infant hospitalization are recognized risk factors for early discontinuation of EBF (10, 14, 15, 25).

One of the most common reasons for late initiation, unnecessary supplementation and early cessation of breast feeding was a combination of inefficient latch or suckling problems, the perception of having insufficient milk to feed the baby, and providing supplementary feeds to the baby leading to a reduction in milk supply, thus completing the circle (6, 7, 10, 13, 25).

Numerous studies have been published during the last decade about the role of pacifiers in infant development and nutrition, discussing the effect of pacifier use not only on breast feeding but also on dental malocclusion, with widely divergent findings. We found 16 studies done outside Iran (17, 18, 20-23, 25, 29-37), and 3 studies from Iran, that fulfilled our inclusion criteria (15, 19, 27). From the researches done abroad, (with accessible full texts), eight studies, including a meta-analysis, reported a deleterious effect of pacifiers on breastfeeding (17-23, 30); five papers refuted these observations (25, 33-35, 37) and findings from four surveys were inconclusive (24, 31, 32, 36). All three studies from Iran claimed that pacifier use is associated with decreased duration of EBF/predominant breast feeding and early introduction of the bottle (5, 19, 27).

Although the WHO recommends total avoidance of pacifiers (48), it has been reported that pacifier use may decrease the rate of the sudden infant death syndrome (SIDS) and the American academy of pediatrics (AAP) advises offering pacifiers to babies at the onset of sleep at 1 month of age, after breast feeding has been established (49). However, studies have demonstrated that the incidence of SIDS varies greatly in different parts of the world, the etiology is multi-factorial and the widely divergent rate may reflect differences in lifestyles and infant caring practices, rather than pacifier use (50).

Several authors have addressed the role of pacifiers in reducing the duration of breast feeding, (Table 2). Perrine et al. from the USA analyzed the data from a previous study done between 2005and 2007 on mothers of healthy singletons and compared their intentions to breast feed and the actual practice. The mothers had been recruited during the third trimester and each had been mailed 1 prenatal and 10 postnatal questionnaires at monthly intervals to gather data about infant feeding patterns and other infant care practices. Although 3006 questionnaires had been mailed prenatally, only women who intended to exclusively breast feed (n = 1792) were included in the analysis; 335 mothers were next excluded for various reasons, (incomplete forms or missing data) and the final analyses was done on 1457 women. Most participants in this study were between 25and 34 years of age, (65.5%) and had studied beyond high school, (84.7%); over 30% were primipara. The authors discovered that not using a pacifier was one of the factors associated with the mothers achieving their intention for EBF, (aOR = 1.3; 95% CI: 1.1, 3.1) (17).

Mauch et al. did a survey on 670 first-time Australian mothers to determine the rate and related variables of pacifier use and the relationship between using pacifiers and the duration of breastfeeding. After adjusting for confounding variables, the authors found a significant difference in breast feeding duration between infants who were given pacifiers before 4 weeks of age and those who never used a pacifier, with increased likelihood of early discontinuation of breastfeeding in the former group (adjHR 3.67; 95% CI 2.14 - 6.28) (18).

Gerd et al. did a longitudinal cohort study to determine factors associated with discontinuation of breast feeding on infants born between October 2001 and December 2008 in Sweden; their observations revealed a negative correlation between breastfeeding and pacifier use, (OR 3.72; CI: 2.09 - 6.63) (20).

All papers from Brazil and one from Spain have also reported a negative association between pacifier and EBF (21-23, 28, 29).

A recent Cochrane review done to determine the effect of restricting the use of pacifiers and to compare it with unrestricted use on the duration of breastfeeding, found no significant difference in the rate of EBF in healthy breast feeding babies at 3 and 4 months of age, (RR 0.99; 95% CI: 0.93 - 1.05 and RR 0.99; CI: 0.92 - 1.06, respectively) (33). This review has included 2 studies in their final analysis, one from Kramer et al in 2001 and the other from Jenik et al in 2009 (35, 37). Study by Jenik et al. was a RCT conducted in Argentina for evaluating the effect of pacifier use on the duration of breast feeding in 1021 mothers of full-term singletons who intended EBF and the primary outcome was continuation of EBF at 3 months (35). The authors noted no significant difference between pacifier users and nonusers in the proportion of EBF infants at 3 months of age. However, this study was done on mothers who were highly motivated for EBF, who were already successfully feeding their infants and pacifiers were started at day 15 after breastfeeding was well-established (35).

Kramer et al. study was an RCT done in Montreal, Canada on 281 mothers of healthy full-term singletons, of whom 258 completed the study. The authors used randomized intervention allocation to investigate if the association between pacifier use and early weaning as reported from observational studies, reveals a causal relationship of pacifier use with early cessation of EBF (37). Although they observed a strong association between pacifier use and early weaning but on randomized allocation no causal association was revealed. The authors suggest that pacifier use may be an indicator of feeding difficulties rather than a cause of early discontinuation of EBF.

Table 2. Studies Reporting on the Effect of Pacifier Use on the Duration of Breast-Feeding [a]

Authors	Year published	Duration of study/ database search	Study type	Location	Sample size (mother-infant pairs)	Pacifier use has –negativeeffect on/-negativeassociation with EBF?	Statistics
Ahmadpour Kacho et al. (19)	2007	January 2003-January 2004	Observational cross- sectional	Iran	220	Yes	CI: 2.3-7.3; OR = 1.24; P < 0.001
Karabulut et al. (30)	2009	Medline data base search (1980-2006)	Meta-analysis	Turkey	15,548	Yes	RR = 1.72; 95%CI: 1.452 - 2.212
Roig et al. (21)	2010	March 2002-2003	Observational cohort	Spain	246	Yes	aHR 1.39; 95%CI: 1.02 - 1.89
Perrine et al. (17)	2012	2005-2007	Observational longitudinal survey	USA	1457	Yes	aOR = 1.3; 95% CI: 1.1, 3.1
Mauch et al. (18)	2012	(February-June 2008) + (September 2008-March 2009)	multi-centre study	Australia	670	Yes	adjHR = 3.67; 95%CI: 2.14 - 6.28
Gerd et al. (20)	2012	October 2007-December 2008	Longitudinal birth cohort	Sweden	2666	Yes	OR = 3.72; CI: 2.09 – 6.63
Olang et al. (5)	2012	September 2005-January 2006	Observational	Iran	63,071	Yes	aOR = 2.4; 95%CI: 2.0, 4.6
Jaafar et al. (33)	2012	Database search: Cochrane Pregnancy and Childbirth Group's Trials Register (14 March 2012).	Meta -analysis	Malaysia	1302	No	RR = 0.99; 95% CI: 0.93 - 1.05
Kair et al. (31)	2013	July-November 2010	Retrospective, post-intervention comparative study	USA	2075	Doubtful	RR/HR not given

[a] Abbreviations: aHR, adjusted hazard ratio; aOR, adjusted Odd's Ratio; CI, confidence interval; EBF, exclusive breastfeeding; RR, risk ratio.

These results are in sharp contrast to a meta-analysis from Turkey published in 2009 which included 31 trials (30). The objective of this study was to determine if pacifier use increases the risk of discontinuing EBF before six months of age or any form of breast-feeding before 24 months. Authors reviewed both cross-sectional and cohort trials published in the English language between 1980 and 2006 and included 12 trials about discontinuation of EBF and 19 trials about weaning from any breastfeeding in their final analyses, which were done on 15,548 mother-infant pairs. The authors found that on analyses of EBF trials, pacifier use compared with no pacifier use reduced the duration of EBF on univariate analysis (RR = 2.016; 95% CI: 1.69 - 2.51) and also on multivariate analysis (RR = 1.72; 95% CI: 1.452 - 2.212). Similarly the risk ratio for early cessation of any breastfeeding in pacifier users before 24 months of age as compared to nonusers was 2.760 (95% CI: 2.083 - 3.657) on univariate analysis and 1.952 (95% CI: 1.622 - 2.293) on multivariate analysis.

4. Conclusions

Although the reports on the relationship between pacifier use and early weaning appear to be conflicting but a review of the studies shows that all observational studies have shown a strong association between early pacifier use and early cessation of exclusive or any breastfeeding. Very few interventional studies were found on literature search; however, even the studies that found no causal association indicate a relationship between pacifier use and early discontinuation of breastfeeding (37). The sole study that reported no difference in the outcome of breastfeeding at 3 months between pacifier users and nonusers was done on mothers already motivated for EBF, (as already stated) and pacifiers were started after first two weeks of life, a period that is crucial in establishment of successful breast feeding (35).

As EBF or, as the second best, predominant breast feeding is of major importance in preventing infections and saving lives, especially in resource-poor developing countries so every effort should be made to promote EBF at least for the first 6 months and discourage practices that may lead to early weaning.

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