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Is Baby-Friendly Breastfeeding Support in Maternity Hospitals Associated with Breastfeeding Satisfaction Among Japanese Mothers?

Hiroko Hongo · Keiko Nanishi · Akira Shibanuma · Masamine Jimba

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Abstract While the World Health Organization's Baby-Friendly Hospital Initiative has increased breastfeeding duration and exclusivity, a survey found that only 8.5 % of maternity hospitals in 31 developed countries could be designated baby-friendly. Baby-friendly breastfeeding support is sometimes criticized as mother unfriendly. This study examined whether baby-friendly breastfeeding support was associated with breastfeeding satisfaction, duration, and exclusivity among Japanese mothers. In this cross-sectional study, 601 breastfeeding Japanese mothers completed questionnaires at their infants' 4-month health checkups at two wards in Yokohama, Japan; 363 were included in the analysis. Baby-friendly breastfeeding support was measured based on the WHO's "Ten Steps to Successful Breastfeeding." We measured satisfaction using two subscales of the Japanese version of the Maternal Breastfeeding Evaluation Scale. The association of baby-friendly support with maternal satisfaction was assessed using multiple linear regression, while the prevalence ratios (PRs) for breastfeeding were estimated using Poisson regression. Mothers were stratified by prepartum exclusive breastfeeding intention (yes, n = 256; no, n = 107). Mothers who experienced early skin-to-skin contact with their infants were more likely to report breastfeeding satisfaction than those who did not. Among mothers without exclusive breastfeeding intention, those who were encouraged to feed on demand were more likely to be breastfeeding without formula at 1 month (PR 2.66 [95 % CI 1.32, 5.36]) and to perceive breastfeeding as beneficial for their baby (regression coefficient = 3.14 [95 % CI 0.11, 6.17]) than those who were not so encouraged. Breastfeeding satisfaction was a useful measure of breastfeeding outcome. Early skin-to-skin contact and encouragement to feed on demand in the hospital facilitate breastfeeding satisfaction.

Keywords Perinatal care · Postpartum period · Intention · Japan · Maternal breastfeeding evaluation

Introduction

Breastfeeding benefits both mothers and babies [1], and longer and more exclusive breastfeeding is associated with decreased risk of infectious diseases, even in developed countries [2]. The World Health Organization (WHO) recommends that infants be breastfed exclusively (without any liquids or foods other than breast milk, with the exception of vitamin, mineral, or medicine drops) for the first 6 months and that breastfeeding continue for 2 years and beyond [1]. The WHO and the United Nations Children's Fund (UNICEF) have also launched the Baby-Friendly Hospital Initiative (BFHI), which recommends maternity hospitals employ its "Ten Steps to Successful Breastfeeding" (hereafter referred to as the Ten Steps; see Table 1), which include ensuring mothers have early skin-to-skin contact with their babies and "room in" with them [3]. The program has increased breastfeeding duration and exclusivity [4–6].

However, in a recent survey of 31 developed countries, only 8.5 % of maternity hospitals met BFHI criteria to be designated as baby-friendly hospitals (BFHs) [7]. In Japan, only 2 % of all maternity facilities were designated as baby-friendly [7–9]. While over 80 % of surveyed

H. Hongo · K. Nanishi (✉) · A. Shibanuma · M. Jimba
Department of Community and Global Health, Graduate School of Medicine, The University of Tokyo, 7-3-1, Hongo, Bunkyo-ku, Tokyo 113-0033, Japan
e-mail: keiko50@m.u-tokyo.ac.jp

hospitals in six prefectures around Tokyo followed at least two of the Ten Steps, only 26.3 % of them practiced rooming-in from the day of delivery [10]. The rate of breastfeeding is high in Japan (95.4 % at 1–2 months and 86.8 % at 3–4 months in 2010), but the rate of infant formula use at the hospital is also high, peaking at 62.2 % on the second day after delivery [11]. The high rates of formula supplementation at hospitals may be linked to institutional policy on infant feeding and ready availability of infant formula [12].

Barriers to BFHI implementation include a negative attitude on the part of the health care provider, for example, reluctance to "pressure" mothers to breastfeed and concern about making mothers feel guilty about formula feeding [13–15]. Some health care providers criticize the BFHI as "mother-unfriendly" [15]. Some Japanese health care providers have also criticized the BFHI and the Ten Steps for focusing only on improving breastfeeding rates [16] and ignoring mothers' perspectives.

To assess maternal well-being, it may be more important to measure satisfaction with breastfeeding than its duration and exclusivity [17, 18]. Accordingly, Leff and associates in the United States developed the Maternal Breastfeeding Evaluation Scale (MBFES) to measure maternal satisfaction with breastfeeding independent of duration or exclusivity [18, 19]. The MBFES has also been validated and used to measure maternal breastfeeding satisfaction in several other developed countries [20–27]. Our previous study validated the Japanese version of the MBFES (JMBFES) [28]. However, no study has examined whether

Table 1 Proportion of mothers receiving baby-friendly breastfeeding support at hospital (n = 363)

	Question	Total (%)	Prepartum intention to breastfeed exclusively		*p* value[b]
			Yes (n = 256) (%)	No (n = 107) (%)	
Ten steps to successful breastfeeding[a]					
Have a written breastfeeding policy that is routinely communicated to all health care staff[c]	N/A	N/A	N/A	N/A	N/A
Train all health care staff in skills necessary to implement this policy[d]	N/A	N/A	N/A	N/A	N/A
Inform all pregnant women about the benefits and management of breastfeeding	Staff informed you of breastfeeding benefits during pregnancy?	279 (77)	197 (77)	82 (77)	0.948
Help mothers initiate breastfeeding within half an hour of birth	You held your baby skin-to-skin within 5 min after birth and continued holding him/her for more than 30 min?	71 (20)	58 (23)	13 (12)	0.021
Show mothers how to breastfeed, and how to maintain lactation even if they should be separated from their infants	Staff showed you how to position and breastfeed your baby?	349 (96)	247 (96)	102 (95)	0.602
Give newborn infants no food or drink other than breast milk, unless medically indicated	Your baby was not given any food or drink other than breast milk?	165 (45)	133 (52)	32 (30)	<0.001
Practice rooming-in—that is, allow mothers and infants to remain together—24 h a day	Start full-time rooming-in with your baby within 24 h after birth?	166 (46)	134 (52)	32 (30)	<0.001
Encourage breastfeeding on demand	Staff advised you to breastfeed whenever and as long as your baby wanted?	122 (34)	98 (38)	24 (22)	0.004
Give no artificial teats or pacifiers (also called dummies or soothers) to breastfeeding infants	Your baby was not given any bottle or pacifier?	110 (31)	94 (37)	16 (15)	<0.001
Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic	Staff introduced community resource for breastfeeding help?	74 (20)	52 (20)	22 (21)	0.957
International code of marketing breast-milk substitutes	Experienced no marketing of infant formula?	97 (27)	80 (31)	17 (16)	0.003

[a] Every facility providing maternity services and care for newborn infants should follow the Ten Steps to Successful Breastfeeding (Source: *Protecting, Promoting and Supporting Breastfeeding: The Special Role of Maternity Services*, a joint WHO/UNICEF statement)

[b] The associations between each element of baby-friendly breastfeeding support and prepartum intention to breastfeed exclusively (by Pearson Chi square)

[c] This step refers to a hospital policy and therefore cannot be measured through mothers' experience

[d] This step refers to staff training policy and therefore cannot be measured through mothers' experience

implementation of the Ten Steps at a hospital is associated with maternal breastfeeding satisfaction or breastfeeding duration and exclusivity. We therefore conducted such a study among Japanese mothers, making our assessments after delivery and at 1 and 4 months postpartum.

Methods

Participants

In this cross-sectional study, we recruited participants from Minami and Asahi, 2 of the 18 wards of the City of Yokohama near Japan's capital Tokyo. Yokohama has a population of 3.7 million people, more than that of any other municipality in Japan. Generally, mothers in the city deliver their infants at a maternity facility and then bring them to a public health center for their 4-month health checkup. In Japan, only 7 out of 1,742 municipalities had more than one designated BFH in 2011 [29]; Yokohama has more than 50 maternity facilities, including 2 designated BFHs [30].

We chose to recruit participants from the public health centers in Minami and Asahi Wards by convenience sampling, because they were easily accessible. One of the city's 2 BFHs is located in Minami Ward, and the demographics of the two wards are similar. The average annual household income in the study area is slightly lower than the national average of US$87,100 (US$1 = ¥80): US$82,500 in Minami Ward and US$77,500 in Asahi Ward. Ninety-four percent of babies in Minami Ward and 98 % of babies in Asahi Ward received a 4-month health checkup at a public health center [31, 32].

Self-administered questionnaires were distributed to breastfeeding mothers who visited the public health centers in Minami and Asahi Wards for their infant's 4-month checkup between December 2011 and March 2012. Completed questionnaires were collected by the first author at participating health centers on the day of the checkup or mailed to her by mothers.

At the health centers, we approached 754 breastfeeding mothers who had a singleton birth, were literate in Japanese, and were more than 16 years old. Among them, 601 filled out and returned the questionnaire. Of these, we excluded 130 participants because (1) the infant was more than 5 months old, (2) the mother or the infant had a medical condition that would significantly interfere with breastfeeding, or (3) the mother had reported prior to delivery that she intended to formula-feed exclusively. Those who planned to formula-feed exclusively were excluded because a Japanese national survey reported that only 1 % of expectant mothers intended to formula-feed exclusively [33], often because of special social or medical conditions. We also excluded 108 participants who had missing data. Our final analysis sample was 363 participants (60 % of those who returned the questionnaire; Fig. 1).

The appropriate sample size was calculated using Power And Precision version 4 (Biostat, Englewood, NJ, USA), assuming that 20 % of women deliver their babies at a BFH [8, 26] and that breastfeeding rate at 1 month would be 83 % among participants who received full baby-friendly breastfeeding support [8] and 52 % among those who received partial baby-friendly breastfeeding support [11]. Accordingly, 140 participants were needed for the survey to have a power of 80 % with an alpha of 0.05.

Exposure Variables

The exposure variables were the levels at which particular elements of baby-friendly breastfeeding support were provided to participants at the hospital. These elements are outlined in the Ten Steps and in the WHO International Code of Marketing of Breast-milk Substitutes (hereafter referred to as the International Code) [34, 35] (see Table 1). The questions used to assess the level of baby-friendly breastfeeding support were extracted from a published Japanese translation of the "Questionnaire or interview for mothers at discharge" tool included in the BFHI materials [34, 36]. This tool is designed to gather feedback from mothers about their experiences in the maternity ward. We made several minor modifications to make the questions relevant to this study.

Most Japanese hospitals do not allow mothers and babies to be together full-time, especially on the day of delivery [10, 33]. We therefore defined "timely rooming-in" (step 7 of the Ten Steps) as starting full-time rooming-in within 24 h of delivery. We defined "early skin-to-skin contact" (step 4) as the mother holding the baby prone against her chest within 5 min of birth, sustaining that position for more than 30 min, and being offered help with breastfeeding by staff [34, 37].

Outcome Variables

The main outcome measure was breastfeeding satisfaction among mothers at 4 months postpartum. Four months after delivery was considered sufficient time for mothers to evaluate their breastfeeding experiences [20, 27]. We used the "maternal satisfaction" and "perceived benefit to baby" subscales of the JMBFES, with 11 and 7 items, respectively; questions were 5-point Likert items. The "maternal satisfaction" subscale (Cronbach's alpha 0.91) [28] measures a mother's satisfaction with personal breastfeeding experiences. The "perceived benefit to baby" subscale (Cronbach's alpha 0.84) [28] measures a mother's perception of breastfeeding's benefit to her baby, including

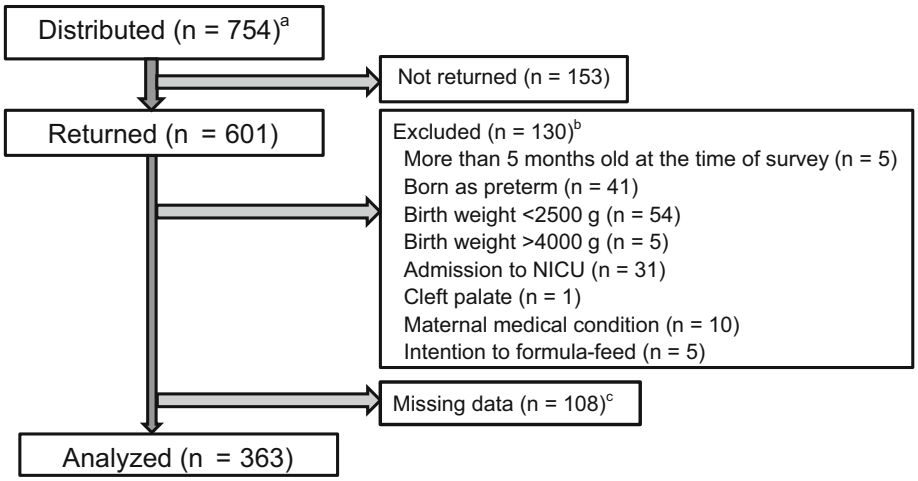


Fig. 1 Flowchart of participants. [a]Self-administered questionnaires were distributed to mothers (>16 years old) with singleton infants visiting 2 public health centers for their infants' 4-month health check-up. [b]The total number of excluded data exceeds 130 because of criteria duplication. [c]Missing data included medical conditions (n = 5), outcome variables (breastfeeding status [n = 0]; one or more scores on the Japanese version of the Maternal Breastfeeding Evaluation Scale (JMBFES) [n = 55]), exposure variables (n = 22), and confounder variables (n = 66). The total number of missing data exceeds 108 because of duplication.

statements about how the baby seems to feel about breastfeeding (e.g., "baby loves/loved to nurse", "baby feels/felt secure") and about the baby's growth and weight gain as a result of breast-milk consumption (e.g., "excellent growth", "gained weight well").

The secondary outcome measure was breastfeeding status after delivery and at 1 and 4 months postpartum. Participants were asked to recall the infant feeding method they had used during routine hospital stay after delivery, with the following response categories: (1) breast milk only, (2) breast milk with sugar water supplementation, (3) breast milk with formula supplementation (mixed feeding), (4) formula only. Those who responded "breast milk only" were classified under "exclusive breastfeeding at hospital." Mothers were also asked to recall the infant feeding method they had used at 1 month, with the following response categories: (1) breastfeeding only, (2) mixed feeding, (3) formula-feeding only. Those who responded "breastfeeding only" were classified under "breastfeeding without formula at 1 month." To determine exclusivity of breastfeeding at 4 months, participants were asked what food or liquid they had given their babies in the past 24 h [38]. The feeding method was classified as "exclusive breastfeeding" only if the mother was breastfeeding and had not given the infant any other food or liquid, including water, in the past 24 h.

Data Analysis

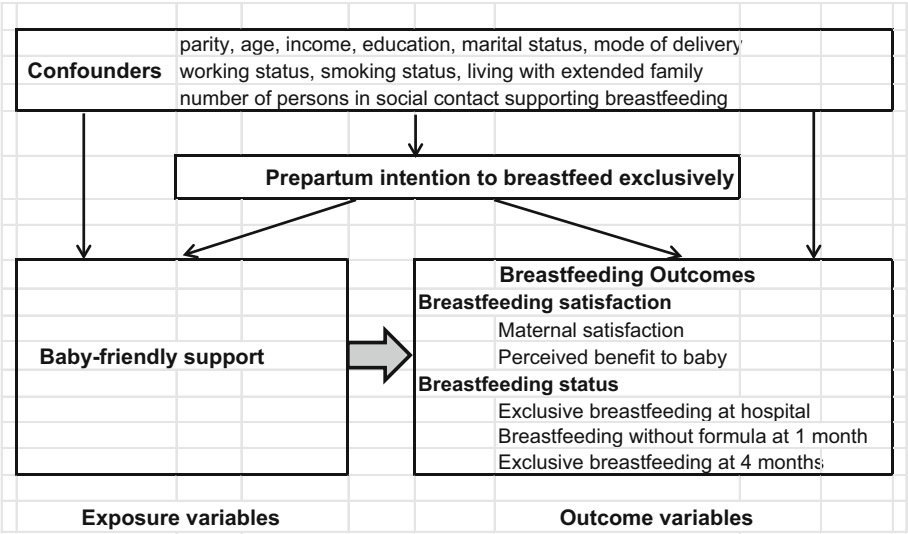
The sociodemographic data are presented either as proportions or as means with standard deviations, while the numbers of mothers receiving particular elements of baby-friendly breastfeeding support are reported as proportions.

We examined the pairwise associations of the baby-friendly breastfeeding support variables with the outcome measures, entering the selected variables into a single model and adjusting for possible confounders and other baby-friendly breastfeeding support variables. Associations of baby-friendly breastfeeding support variables with maternal breastfeeding satisfaction were assessed using multiple linear regression analysis. Prevalence ratios (PRs) of breastfeeding were estimated using the Poisson regression. We did not use odds ratios because doing so can result in substantial overestimation of prevalence ratios when analyzing outcomes that are not rare [39, 40]. Heteroskedasticity-robust standard errors were estimated for all regression models.

Our analysis was conducted without regard to whether the maternity hospital was designated as a BFH; this study makes no comparison between mothers who delivered in designated BFHs and those who delivered in hospitals without this designation.

When we examined the associations of outcome measures with the baby-friendly breastfeeding support variables, there were several special considerations. Step 5 of the Ten Steps (being shown how to breastfeed) was excluded because 96 % of participants reported that they were shown how to breastfeed. To avoid multicollinearity, step 6 (no supplement without medical reasons) and step 9 (not using bottles and pacifiers) were excluded from the multiple regression models because they were strongly correlated with step 7 (timely rooming-in) and compliance with the International Code (no on-site formula marketing) (Spearman's rho >0.5). Terms describing the interactions between each baby-friendly breastfeeding support variable

Fig. 2 Conceptual framework



and parity were generated for each outcome through regression analysis, as parity is known to be associated with breastfeeding outcomes [41, 42]. Finally, the interaction between being informed of breastfeeding benefits and parity ($p < 0.05$) was included in the multiple regression model for "perceived benefit to baby."

Breastfeeding outcomes are known to be associated with maternal factors [41–48]. In the present study, we stratified the model by the mother's prepartum intention to breastfeed exclusively, as this was significantly associated with several baby-friendly breastfeeding support variables (Table 1). Mothers who had intended to mixed-feed or had been undecided were classified as not having intended to breastfeed exclusively. We adjusted for the following potential maternal confounders: age, income, education, marital status, mode of delivery, working status, smoking status, living with extended family, and number of persons in social contact (family, peers, health workers, and others) supporting breastfeeding. We classified an annual household income of 3 million yen (US$37,500) or less as low income [49].

All analyses were conducted using Stata version 11 (Stata Corporation, College Station, TX, USA). In all analyses, $p < 0.05$ was considered significant. The conceptual framework is shown in Fig. 2.

Ethical Considerations

Before the questionnaires were distributed, all participants were informed of the aims of the study. To maintain the confidentiality of all the participants, the questionnaires were filled out anonymously. Participants were also told that filling out and submitting the questionnaire would be taken as provision of informed consent. These procedures were approved by the public health centers and by the Research Ethics Committee of the Graduate School of Medicine at the University of Tokyo.

Results

Participants

The mean age of the participants was 31.9 years (SD 4.8). Almost all were married, non-smokers, and middle-income (Table 2). Half of the participants (52 %) were multiparas. Seventy-one percent (n = 256) had reported that they intended to breastfeed exclusively prior to delivery and 107 (29 %) had reported that they intended to mixed-feed or were undecided. Participants who had intended to breastfeed exclusively were likely to have a higher household income ($p = 0.04$). The proportions of participants receiving particular elements of baby-friendly breastfeeding support at the hospital are shown in Table 1. While only 33 % of all participants breastfed exclusively at the hospital, 56 % were no longer using formula supplementation at 1 month, and 63 % were breastfeeding exclusively at the time of their baby's 4-month check-up (Fig. 3). The average duration of hospital stay was 6.2 days (SD 1.9).

Breastfeeding Satisfaction

Maternal Satisfaction

Maternal breastfeeding satisfaction at 4 months was positively or negatively associated with 3 baby-friendly breastfeeding support variables (Table 3). Among mothers who had intended to breastfeed exclusively, being informed of breastfeeding benefits (step 3) was associated with higher scores on the "maternal satisfaction" subscale of the

Table 2 Characteristics of participants by prepartum intention to breastfeed exclusively (n = 363)

Variables	Total	Prepartum intention to breastfeed exclusively		*p* value
		Yes (n = 256)	No (n = 107)	
Household income >$37,500/year [n (%)][a]	335 (92 %)	241 (94 %)	94 (88 %)	**0.04**
Education above high school [n (%)]	278 (77 %)	201 (79 %)	77 (72 %)	0.18
Married [n (%)]	358 (99 %)	252 (98 %)	106 (99 %)	0.64
Multipara status [n (%)]	188 (52 %)	128 (50 %)	60 (56 %)	0.29
Living with extended family [n (%)]	41 (11 %)	26 (10 %)	15 (14 %)	0.29
Not working within 1 year of delivery [n (%)][b]	286 (79 %)	197 (77 %)	89 (83 %)	0.19
Non-smoking [n (%)][c]	356 (98 %)	253 (99 %)	103 (96 %)	0.10
Vaginal birth [n (%)]	310 (85 %)	219 (86 %)	91 (85 %)	0.90
Age (years) [mean (SD)]	31.9 (4.8)	31.9 (4.7)	31.9 (4.9)	0.96
Number of persons in social contact supporting breastfeeding [mean (SD)]	2.7 (1.3)	2.7 (1.3)	2.6 (1.3)	0.27

Bold value indicates statistical significant ($p < 0.05$)

[a] ¥3 million ($1 = ¥80)

[b] No stated plan to work or study outside the home within 1 year of baby's birth

[c] Did not smoke in the past 7 days

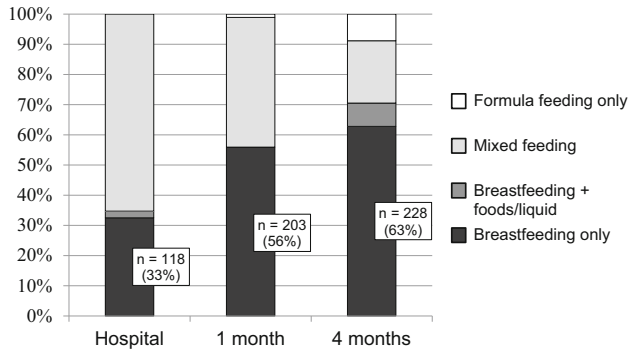


Fig. 3 Distribution of breastfeeding status (n = 363). Breastfeeding status measurements: (1) Hospital—mothers' reported breastfeeding at hospital: [a] breast milk only, [b] breast milk with sugar water supplementation, [c] breast milk and formula supplementation (mixed feeding), [d] formula only. (2) 1 month—mothers' reported breastfeeding at 1 month postpartum: [a] breastfeeding without infant formula, [b] mixed feeding, [c] formula-feeding only. (3) 4 Months—exclusive breastfeeding status based on mothers' 24-hour recall: [a] exclusive breastfeeding, [b] breastfeeding + foods or liquid other than formula, [c] mixed feeding, [d] formula-feeding only

JMBFES (regression coefficient = 2.27 [95 % CI 0.23, 4.30]). Among mothers who had not intended to breastfeed exclusively, early skin-to-skin contact (step 4) was associated with higher scores on the subscale (regression coefficient = 6.33 [95 % CI 1.57, 11.1]). However, absence of formula marketing at the hospital (International Code) was associated with lower subscale score among mothers who had not intended to breastfeed exclusively (regression coefficient = −6.32 [95 % CI −11.07, −1.58]).

Perceived Benefit to Baby

Perceived breastfeeding benefit to baby at 4 months was positively associated with two elements of baby-friendly breastfeeding support at the hospital (Table 3). Among mothers who had intended to breastfeed exclusively, early skin-to-skin contact (step 4) was associated with higher scores on the "perceived benefit to baby" subscale of the JMBFES (regression coefficient = 1.44 [95 % CI 0.39, 2.48]). Among mothers who had not intended to breastfeed exclusively, encouragement from staff to feed on demand (step 8) was associated with a higher subscale score (regression coefficient = 3.14 [95 % CI 0.11, 6.17]).

Mothers who were informed of breastfeeding benefits tended to have higher "perceived benefit to baby" scores than mothers who were not informed of breastfeeding benefits, but the difference did not reach statistical significance at $p < 0.05$. The reverse was true for the interaction between being informed of breastfeeding benefit and parity, but this difference did not reach statistical significance, either.

Breastfeeding Duration and Exclusivity

Breastfeeding without formula was positively associated with 4 elements of baby-friendly breastfeeding support. Exclusive breastfeeding at the hospital was positively associated with timely rooming-in (step 7) and absence of formula marketing (International Code) regardless of prepartum intention to breastfeed exclusively.

Breastfeeding without formula after hospital discharge was positively associated with different elements of baby-friendly breastfeeding support depending on mothers' prepartum intention to breastfeed exclusively. Among mothers who had intended to breastfeed exclusively, breastfeeding without formula at 1 month was positively associated with timely rooming-in (step 7; PR 1.57 [95 % CI 1.29, 1.90]), and exclusive breastfeeding at 4 months

Table 3 Association between maternal satisfaction and selected baby-friendly breastfeeding support variables, stratified by prepartum intention to breastfeed exclusively (n = 363)

Variables[a]	Prepartum intention to breastfeed exclusively[b]	JMBFES subscale[c]			
		Maternal satisfaction		Perceived benefit to baby	
		Regression coefficient	95 % CI	Regression coefficient	95 % CI
Ten steps to successful breastfeeding					
Step 3: Informed of breastfeeding benefits	Yes	**2.27**	**0.23, 4.30**	2.19	−0.03, 4.42
	No	−0.09	−3.65, 3.46	2.85	−0.10, 5.80
Step 3 × multipara	Yes	–	–	−2.43	−5.04, 0.17
	No	–	–	−3.63	−7.53, 0.27
Step 4: Early skin-to-skin contact	Yes	1.67	−0.12, 3.46	**1.44**	**0.39, 2.48**
	No	**6.33**	**1.57, 11.1**	2.40	−0.70. 5.50
Step 7: Timely rooming-in	Yes	0.55	−1.13, 2.24	0.79	−0.34, 1.92
	No	−1.33	−4,52, 1.86	0.85	−1.75, 3.45
Step 8: Feeding on demand	Yes	0.86	−0.64, 2.35	−0.03	−1.10, 1.04
	No	−0.68	−4.89, 3.54	**3.14**	**0.11, 6.17**
Step 10: Informed of community resources	Yes	0.44	−1.09, 1.96	0.87	−0.28, 2.01
	No	−0.95	−4.48, 2.58	−0.41	−2.96, 2.14
International code: No on-site formula marketing	Yes	−1.44	−2.97, 0.10	−0.53	−1.59, 0.53
	No	**−6.32**	**−11.07, −1.58**	−2.80	−7.12, 1.53
Multipara status	Yes	0.63	−0.85, 2.10	**3.14**	**0.80, 5.49**
	No	−1.78	−5.18, 1.61	1.64	−1.62, 4.91
Living with extended family	Yes	−0.90	−2.92, 1.11	−0.75	−1.99, 0.49
	No	0.54	−2.96, 4.03	**2.62**	**0.18, 5.07**
Number of persons in social contact supporting breastfeeding	Yes	**0.61**	**0.08, 1.13**	**0.58**	**0.12, 1.04**
	No	−0.002	−1.11, 1.11	−0.24	−1.15, 0.68

The boldface numbers indicate statistical significance ($p < 0.05$)

[a] Adjusted for selected baby-friendly breastfeeding support variables, parity, living with extended family, number of persons in social contact supporting breastfeeding, and other confounders (age, income, educational status, marital status, smoking status, working status, mode of birth)

[b] Yes: intended to breastfeed exclusively (n = 256); no: intended to mixed-feed or was undecided (n = 107)

[c] Japanese version of the Maternal Breastfeeding Evaluation Scale; maternal satisfaction with breastfeeding was measured on a 5-point Likert scale with 11 items (score range: 5–55; Cronbach's alpha = 0.91); perceived benefit to baby was measured on a 5-point Likert scale with 7 items (score range: 7–35; Cronbach's alpha = 0.84)

was positively associated with being informed of community resources (step 10; PR 1.20 [95 % CI 1.01, 1.42]). Among mothers who had not intended to breastfeed exclusively, breastfeeding without formula at 1 month was positively associated with encouragement from staff to feed on demand (PR 2.66 [95 % CI 1.32, 5.36]), and exclusive breastfeeding at 4 months was positively associated with timely rooming-in (PR 1.72 [95 % CI 1.06, 2.78]).

Breastfeeding practice was also associated with support after discharge among mothers who had intended to breastfeed exclusively. Breastfeeding without formula at 1 month was positively associated with the number of persons in social contact supporting breastfeeding (PR 1.05 [95 % CI 1.00, 1.11]) but negatively associated with living with extended family (PR 0.65 [95 % CI 0.46, 0.92]) (Table 4).

Discussion

Participants reported breastfeeding satisfaction when they received particular elements of baby-friendly breastfeeding support, and some of the factors associated with satisfaction were different from those associated with breastfeeding

Table 4 Prevalence ratios of breastfeeding for baby-friendly breastfeeding support variables, stratified by prepartum intention to breastfeed exclusively (n = 363)

Variables[a]	Prepartum intention to breastfeed exclusively[b]	Exclusive breastfeeding at hospital		Breastfeeding without formula at 1 month		Exclusive breastfeeding at 4 months	
		PR	95 % CI	PR	95 % CI	PR	95 % CI
Ten steps to successful breastfeeding							
Step 3: Informed of breastfeeding benefits	Yes	1.03	0.74, 1.41	0.86	0.71, 1.04	0.95	0.78, 1.16
	No	1.74	0.59, 5.13	0.66	0.29, 1.49	1.10	0.60, 2.02
Step 4: Early skin-to-skin contact	Yes	1.16	0.88, 1.51	1.13	0.94, 1.35	1.17	0.97, 1.40
	No	1.29	0.50, 3.28	1.58	0.55, 4.51	0.97	0.49, 1.93
Step 7: Timely rooming-in	Yes	**6.39**	**3.19, 12.82**	**1.57**	**1.29, 1.90**	1.02	0.82, 1.28
	No	**10.26**	**2.10, 50.19**	1.56	0.76, 3.22	**1.72**	**1.06, 2.78**
Step 8: Feeding on demand	Yes	0.97	0.73, 1.29	0.86	0.72, 1.01	1.12	0.93, 1.35
	No	**3.66**	**1.30, 10.35**	**2.66**	**1.32, 5.36**	1.51	0.97, 2.36
Step 10: Informed of community resources	Yes	1.22	0.93, 1.59	1.06	0.87, 1.28	**1.20**	**1.01, 1.42**
	No	**0.11**	**0.04, 0.31**	1.02	0.45, 2.29	0.98	0.30, 2.28
International code: No on-site formula marketing	Yes	**2.10**	**1.50, 2.96**	1.08	0.91, 1.28	1.09	0.84, 1.24
	No	**5.34**	**1.88, 15.14**	0.99	0.37, 2.69	1.17	0.26, 2.89
Multipara status	Yes	1.06	0.82, 1.37	**1.45**	**1.22, 1.73**	**1.19**	**1.01, 1.40**
	No	**4.31**	**2.23, 8.31**	1.09	0.51, 2.31	0.69	0.44, 1.07
Living with extended family	Yes	0.93	0.67, 1.29	**0.65**	**0.46, 0.92**	1.00	0.95, 1.05
	No	0.37	0.12, 1.16	0.60	0.23, 1.52	0.97	0.80, 1.17
Number of persons in social contact supporting breastfeeding	Yes	0.98	0.89, 1.07	**1.05**	**1.00, 1.11**	1.00	0.95, 1.05
	No	**1.76**	**1.13, 2.74**	0.93	0.73, 1.20	0.97	0.80, 1.17

The boldface numbers indicate statistical significance ($p < 0.05$)

PR prevalence ratio

[a] Adjusted for selected baby-friendly breastfeeding support variables, parity, living with extended family, number of persons in social contact supporting breastfeeding, and other confounders (age, income, educational status, marital status, smoking status, working status, mode of birth)

[b] Yes: intended to breastfeed exclusively (n = 256); no: intended to mixed-feed or was undecided (n = 107)

duration and exclusivity. Specifically, experiencing early skin-to-skin contact was positively associated with mothers' breastfeeding satisfaction, while experiencing timely rooming-in was associated with longer breastfeeding duration and greater exclusivity. On the other hand, encouragement from hospital staff to feed on demand was positively associated with both perceived breastfeeding benefit to baby and with longer-duration, more exclusive breastfeeding among mothers who had not intended to breastfeed exclusively.

Breastfeeding Practice

While only one-third of mothers reported exclusive breastfeeding at the hospital, 56–63 % of mothers reported no longer using formula supplementation during later months. Although measurements differed, the trend of higher breastfeeding rate during later months was consistent with the results of the 2010 national survey in Japan: 51.6 % at 1–2 months and 56.8 % at 3–4 months [11]. This trend appears to be unique, with the breastfeeding rate in other countries tending to decrease from month to month [50], and may be partly because maternity ward staff in Japanese hospitals that do not comply with the BFHI use formula routinely. The breastfeeding rate may be more influenced by this hospital policy during the earlier months than the later months, as mothers can continue breastfeeding after discharge and may increase their milk supply if they have adequate support in the community or at home.

Baby-Friendly Breastfeeding Support at the Hospital

Mothers experiencing early skin-to-skin contact were likely to report higher breastfeeding satisfaction than those who did not experience this. Early skin-to-skin contact is known to positively affect breastfeeding rates at 1–4 months and maternal positive affective involvement and responsiveness 12 months after birth [51]. The WHO's training manual for maternity staff encourages all mothers to engage in early skin-to-skin contact [52]. Our study provides evidence that early skin-to-skin contact may also

increase maternal breastfeeding satisfaction even among mothers who have no intention to breastfeed exclusively.

Mothers to whom no formula was marketed tended to report lower maternal satisfaction when they did not intend to breastfeed exclusively. In studies from the United States, receiving a gift pack with formula was negatively associated with breastfeeding duration [53] and exclusivity [49]. In our study, absence of formula marketing at hospitals and maternal breastfeeding satisfaction were negatively associated among mothers who did not intend to breastfeed exclusively. Mothers who had intended to mixed-feed or had been undecided about their feeding method may have had more positive attitudes toward formula [54] and may have felt that they were being pressured to breastfeed exclusively if formula marketing was not allowed at the hospital. Extra attention and individual counseling may be needed for expectant mothers who intend to mixed-feed or are undecided about their feeding method.

Mothers were more likely to breastfeed without formula if rooming-in was started within 24 h after delivery. A positive effect of rooming-in on breastfeeding duration has also been shown by a non-parametric survival analysis on breastfeeding among mothers in Mexico [55]. However, our results are contradicted by three population-based studies from the United States [42, 43, 53] in which no association between rooming-in and breastfeeding was found through multivariate analyses. This may be partly explained by differences in method of analysis. Our study excluded steps 6 and 9 of the Ten Steps from the regression to avoid multicollinearity. Also, considering that postpartum hospital stays tend to be longer in Japan than in the United States [56], the effect of timely rooming-in may be stronger in Japanese hospitals than in American ones.

Even if mothers did not intend to breastfeed exclusively prior to delivery, they were more likely to breastfeed without formula and to perceive breastfeeding as beneficial to their babies when they were encouraged to breastfeed on demand. The "perceived benefit to baby" subscale of the JMBFES includes the baby's eagerness to suckle and weight gain/growth. Unrestricted breastfeeding may contribute to more frequent feeding and greater baby weight gain [57]. Hospital staff encouraging mothers to feed on demand may lead to more frequent and longer feeds, as well as making mothers more likely to breastfeed over a prolonged period, to do so exclusively, and to perceive breastfeeding as beneficial to their baby.

Mothers who had been informed about the benefits of breastfeeding also tended to perceive such benefits to their baby regardless of prepartum intention to breastfeed exclusively. However, the association did not reach statistical significance. This may be partly explained by a lack of statistical power due to the small sample size, especially as we stratified the data by intention to breastfeed exclusively.

Importance of Breastfeeding Support After Discharge

Support after discharge is important for encouraging mothers to continue breastfeeding. Among mothers who had intended to breastfeed exclusively before giving birth, those who were informed of community resources for supporting breastfeeding were more likely to breastfeed exclusively at 4 months than those who were not so informed. The more persons in social contact with mothers supported breastfeeding, the more likely mothers were to be satisfied with breastfeeding when they had intended to breastfeed exclusively. However, mothers living with extended family were more likely to use formula at 1 month; their mothers and mothers-in-law may have advised against exclusive breastfeeding, as 30–40 years ago, they probably did not breastfeed exclusively. The current national breastfeeding rate at 1–2 months is 51.6 % [11], but in 1970 it was 31.7 %, and in 1980 it was 45.7 % [58]. These factors likely explain why support from multiple sources was especially important for encouraging mothers to continue breastfeeding and promoting breastfeeding satisfaction.

Limitations and Strengths

This study may be subject to recall bias because the level of baby-friendly breastfeeding support was identified based on mothers' retrospective self-report. However, a study in the United States indicated that mothers' self-report on perinatal events experienced 10–15 years prior to the survey can generally be regarded as accurate and reliable [59]. In this study, information on perinatal support at the hospital was collected not years later but within months of delivery.

Almost all the participants in this study were nonsmoking, middle-class Japanese mothers who were not then working outside the home. Mothers who smoke, are economically deprived, or work outside the home may have more risk of early breastfeeding attrition [6, 60]. Further research targeting such mothers is warranted.

Despite these limitations, our study has several distinct strengths. To the best of our knowledge, it is the first to examine the association of baby-friendly breastfeeding support at the hospital with breastfeeding satisfaction among mothers. It is also the first study in Japan to examine the association of such support with breastfeeding duration and exclusivity. Our study suggests that receiving key elements of baby-friendly breastfeeding support can help mothers breastfeed successfully and promote breastfeeding satisfaction and provides insight about the importance of baby-friendly breastfeeding support at the hospital in terms of maternal satisfaction with breastfeeding.

Conclusion

For the Japanese mothers in our study, perceived breastfeeding satisfaction at 4 months was a useful measure of breastfeeding outcome. Mothers are more likely to be satisfied with breastfeeding and perceive it as beneficial to their baby, independent of breastfeeding duration and exclusivity, if they have early skin-to-skin contact with their infant and are encouraged to feed it on demand. In order to facilitate higher rates of both breastfeeding and breastfeeding satisfaction, we recommend that more Japanese maternity hospitals adopt early skin-to-skin contact and timely rooming-in and that their staff encourage mothers to feed on demand and inform them of community resources for breastfeeding support. Furthermore, more breastfeeding support is needed at both community and household levels.

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