



Association Between Mental Health and Feeding Methods among 1- Month Postpartum Women in Japan: A Cross-Sectional Study

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ABSTRACT

Background: The rate of predominant breastfeeding was 51.3% at 1 month postpartum, even though 93.4% of Japanese mothers expressed a desire to predominantly breastfeed during pregnancy. A wide range of historical, socioeconomic, cultural, and individual factors, as well as mental health, affect breastfeeding practices. However, the relationship between breastfeeding and mental health—depressive symptoms—has been controversial.

Purpose: The aim of this study was to identify factors relationship including mental health and the feeding methods adopted by mothers at 1 month postpartum in Japan.

Methods: A cross-sectional study was conducted at 2 Tokyo area hospitals between July and October 2014. We recruited a total of 560 eligible women. The participants included 392 women without severe illnesses or low birth weight babies at 1 month postpartum. The feeding methods were “mainly breastfeeding” (exclusively or mostly breastfeeding) and “mixed feeding and formula only”. Depressive symptoms as a mental health were assessed using the Edinburgh Postnatal Depression Scale (EPDS). Multiple logistic regression analysis clarified the factors associated with mainly breastfeeding.

Results: The mean (SD) age for the categories of mainly breastfeeding and mixed feeding and formula only was 33.0 (5.1) and 33.9 (5.5) years, respectively ($p = 0.085$). Women who were mainly breastfeeding at 1 month postpartum were more likely to be multiparous (adjusted odds ratio [AOR]: 1.80, CI:1.11 - 2.94), had EPDS score < 9 (AOR:1.87, CI:1.09 - 3.20), and had been desirous of breastfeeding from their pregnancy (AOR: 7.73, CI: 4.68 - 12.74).

Conclusion: Our results suggested that healthcare providers should focus on the relationship between feeding methods and new mothers' mental health. Further research must identify effective care strategies for women who desire to breastfeed exclusively.

Keywords: Breast Feeding; Psychiatric Status Rating Scales; Postpartum period; Mental health

BACKGROUND

Breastfeeding is beneficial for the health of both infants and mothers (Victoria et al., 2016). Especially, exclusive breastfeeding for the first six months of life is a recommended method, because of its established benefits of reducing the risks of hospitalization and morbidity in infants (Yamakawa et al., 2015). For mothers, breastfeeding is associated with postpartum weight loss (Lambrinou et al., 2019), protections against breast and ovarian cancer (Victoria et al., 2016), reduction of coronary heart disease (Peters et al., 2017) and type 2 diabetes (Gunderson et al., 2018). However, duration of exclusive breastfeeding remains shorter than recommended which is six months in many parts of the world (World Health Organization, 2021). In Japan, the “Support Guide for Breastfeeding and Weaning” (Health & Welfare, 2019; Japanese, 2021) has been prepared for medical professionals to promote and support breastfeeding. In 2015, however, the rate of predominant breastfeeding was 51.3% at 1 month postpartum and 54.7% at 3 months postpartum, even though 93.4% of Japanese mothers expressed a desire to predominantly breastfeed during pregnancy (Health & Labour, 2015). Thus, the mothers’ wishes were not fulfilled, and the Japanese government has not been able to achieve a goal that was set to increase the exclusive breastfeeding rate in Japan at 1 month postpartum to 60% (Health & Welfare, 2020).

In addition, out of the 93.4% mothers who intended to breastfeed during pregnancy, while only 43.0% strongly desired to exclusively breastfeed, 50.4% had a desire to do so if their breast milk secretion was good. Of all the women who desired to breastfeed, only 50% actually implemented predominant breastfeeding, presume that mothers who did not strongly desire to breastfeed exclusively have shifted to mixed feeding or formula feeding. However, the participants of this report were different from those who wished to breastfeed and those who actually breastfeeding. Therefore, it is unclear whether the actual practice of breastfeeding is associated with the strength of the desire to exclusively breastfeed during pregnancy or not.

A wide range of historical, socioeconomic, cultural, and individual factors (Victoria et al., 2016), as well as mental health (Brown et al., 2016), affect breastfeeding practices. In Japan, a cross-sectional study showed that the postpartum factors related to exclusive breastfeeding include sufficient childcare leave, private conversations with one’s spouse regarding breastfeeding, having a birth attendant and/or nurse, and having a peer in a childrearing circle (Kaneko et al., 2006). Another cross-sectional study of 262 in-hospital breastfeeding mothers in Japan revealed among the mother’s using formula, 73% cited perceived insufficient milk as the primary reason for supplementation or completely discontinuing breastfeeding (Otsuka et al., 2008). In addition, although there is a possible relationship between breastfeeding and postpartum depression (Brown et al., 2016), the relationship between breastfeeding and mental health—depressive symptoms—has been controversial (Carley & Mazmanian, 2016). Thus, we hypothesize that actual feeding methods at 1 month postpartum are associated with the techniques preferred by mothers during pregnancy and low score (< 9) of the Edinburgh Postnatal Depression Scale (EPDS).

OBJECTIVE

We aim to identify factors relationship including mental health and the feeding methods adopted by mothers at 1 month postpartum in Japan.

METHODS

Design and setting

We conducted this cross-sectional study at a university hospital and a private obstetric hospital in the Tokyo metropolitan area between July and October 2014. The university hospital has almost 1,000 births per year. Only midwives advise mothers on matters of health and breastfeeding during pregnancy and the postpartum period. The private obstetric hospital has almost 1,500 normal births per year. More nurses than midwives work in the obstetric and outpatient wards. However, midwives provide care for breastfeeding issues in the obstetric ward during the mothers' stay in the hospital.

Participants

We recruited healthy women at 1 month postpartum who visited the hospitals for their health check-ups. We included women who gave birth a single healthy baby with no diseases. The exclusion criteria were (1) dietary restrictions for diabetes or hypertension; (2) severe pregnancy complications, psychological illnesses, or breast disease; (3) a baby with low birth weight or any medical condition; (4) being under 20 years of age; and (5) inadequate Japanese literacy.

Data collection

Researchers and medical staff at the outpatient ward checked for eligibility, and eligible women were recruited and provided with a description of the study in an outpatient waiting room. All participants provided written consent. Participants were given the questionnaires, which they were asked to complete either right away or at home and return within a week by mail. If the questionnaires were not returned within 2 weeks or were returned partially completed, clarification was obtained by contacting the participants directly by phone, e-mail, or post.

Procedure

Participants completed questionnaires related to actual feeding methods at 1 month postpartum, which included participant characteristics and preferred feeding methods during pregnancy.

Participant characteristics

We collected data on age, parity, infant birth weight, smoking habits, occupation status (homemaker, on maternity leave, working, or having quit a job during pregnancy), social support for housework, and depressive symptoms (to assess mental health) from self-administered questionnaires and medical charts. We evaluated any depressive symptoms at 1 month postpartum using the Japanese version of EPDS (Okano et al., 1996), which was originally developed by (Cox et al., 1987).

The EPDS is a self-reported scale designed to screen for postpartum depression. Postpartum women responded to 10 items on how they felt over the past 7 days. Each item was scored on a 4-point Likert scale (from 0 to 3), with the total scores ranging from 0 (minimum) to 30 (maximum). In the Japanese version, the cutoff is set at 8/9 points, which gives a reported specificity of 93% and a sensitivity of 75%. In this study, we considered participants with an EPDS score of ≥ 9 to have depressive symptoms. The Cronbach's alpha coefficient for the EPDS was 0.83 in the present study.

Feeding methods

We noted the mothers' preferred feeding methods during pregnancy as well as the methods they actually implemented. The participants chose from 5 feeding methods:

- (1) exclusive breastfeeding (only breast milk without additional drinks);
- (2) mostly breastfeeding (breast milk and occasionally other drinks);
- (3) mixed-B (breast milk > formula);
- (4) mixed-F (formula > breast milk);
- (5) formula only (water, water-based drinks, and fruit juice).

Data analysis

The sample size for this study was calculated to be at least 160. In multivariate analysis, it is common practice to set the sample size at 10 times the number of variables selected. Since the number of variables analyzed in this study was 8 and the breastfeeding rate was 51% from previous studies, the sample size was calculated to be more than 80. In addition, a sample size of at least twice as large as 160 was required to account for the proportion of participants in the independent variables.

We used multiple logistic regression analysis to clarify the factors associated with actual feeding methods at 1 month postpartum. We classified the 5 feeding techniques into 2 categories that served as the dependent variables: (1) "mainly breastfeeding" (exclusively or mostly breastfeeding) and (2) "mixed feeding and formula only" (mixed-B, mixed-F, and formula only). We performed the t-test, chi-square test, and Fisher's exact test to identify potential variables associated with the feeding methods. We selected variables with $p < 0.10$ and the participants' age (an important variable) as independent variables for the multiple logistic regression analysis, checking them for multicollinearity. All statistical analyses were performed using SPSS for Windows, version 18.0 (Shishehgar et al., 2013). We considered 2-tailed P-values less than 0.05 statistically significant.

Ethical considerations

The Research Ethics Committee of the University of Tokyo's Graduate School of Medicine (No. 10536-4) approved this study. All participants were informed of the study purpose by the researchers and provided written consent. They were informed that they could refuse to participate or withdraw from the study at any time without penalty. All participants were given a complimentary prepaid card to purchase books as an incentive to participate.

RESULTS

Participants

We recruited a total of 560 eligible women. And then, 500 (89.3%) participants provided written informed consent and 402 finally responded to the questionnaire. Sixteen percent (n=92) of women who informed consent dropped out because they planned to answer and return the questionnaire at home but did not mail it. Of these 408 (72.9%) women, we excluded 16 from the analysis owing to missing data and twin babies. Thus, we obtained the data available for analysis from 392 (70%) women at 1 month postpartum.

Table 1 summarizes the rate of different feeding methods at 1 month postpartum. As shown, 41.1% (n = 161) of the women adopted exclusive breastfeeding, 12.5% (49) used mostly breastfeeding, 29.8% (117) chose the mixed-B approach, 13.8% (54) selected the mixed-F technique, and 2.8% (11) used formula only. The participants'

preferred feeding methods during pregnancy were exclusive breastfeeding (39.9%, n = 156), mostly breastfeeding (24.6%, 96), mixed-B (30.2%, 118), mixed-F (4.6%, 18), and formula only (0.8%, 3), in this order. These results show that the actual feeding methods at 1 month postpartum were significantly associated with the participants' preferred feeding methods during pregnancy ($p < 0.001$).

Table 1 Relation to Mothers' preferred feeding methods during pregnancy and actual feeding methods at 1month postpartum

	ALL	Exclusive [†]	Mostly [‡]	Mixed-B (breast > formula) [§]	Mixed-F (breast < formula) [¶]	Formula ^{††}	P^{**}
	392	161 (41.1)	49 (12.5)	117 (29.8)	54 (13.8)	11 (2.8)	
Mothers' preferred feeding methods during pregnancy							
Exclusive [†]	156 (39.9)	98 (25.1)	10 (2.6)	34 (8.7)	11(2.8)	3 (0.7)	< 0.001 ***
Mostly [‡]	96 (24.6)	38 (9.7)	32 (8.8)	18(4.6)	6 (1.5)	2 (0.5)	
Mixed-B (breast > formula) [§]	118(30.2)	23 (5.9)	6 (1.5)	63 (16.1)	24 (6.1)	2 (0.5)	
Mixed-F (breast < formula) [¶]	18 (4.6)	1 (0.3)	1 (0.3)	1 (0.3)	13 (3.3)	2 (0.5)	
Formula ^{††}	3 (0.8)	0 (0)	0 (0)	1 (0.3)	0 (0)	2 (0.5)	

Data are n (%), ††; Chi-square test, Missing data were excluded from analysis. ***, $P < 0.001$

†; Exclusive: breast milk without any additional drink, ‡; Mostly: breast milk and occasionally any other drinks

§; Mixed-B: breast milk > formula, ¶; Mixed-F: breast milk < formula, ††; Formula: formula only

Table 2 Participant's characteristics and Feeding methods at 1 month postpartum

	ALL	Mainly breast feeding [†]	Mixed feeding and Formula [‡]	P^{**}
	392	210 (53.6)	182 (46.4)	
Age (years)	33.4±5.2	33.0±5.1	33.9±5.5	0.085
Parity, Primipara	195 (49.7)	83 (39.5)	112 (61.5)	< 0.001 ***
Multipara	197 (50.3)	127 (60.5)	70 (38.5)	
Infant birth weight (g)	3122.5±344.5	3143.1±351.2	3098.8±335.9	
Hospital, Private obstetric hospital	195 (49.7)	86 (41.0)	109 (59.9)	< 0.001 ***
University hospital	197 (50.3)	124 (53.6)	73 (40.1)	
Edinburgh Postnatal Depression Scale; < 9	291 (74.2)	171 (81.4)	120 (65.9)	< 0.001 ***
≥ 9	101 (25.8)	39 (18.6)	62 (34.1)	
Smoking	108 (27.6)	64 (30.5)	44 (24.2)	0.100
Occupation				
Homemaker	140 (35.9)	80 (38.1)	60 (33.3)	0.750
Maternity leave	180 (46.2)	95 (45.2)	85 (47.2)	
Working	11 (2.8)	6 (2.8)	5 (2.8)	
Quit work during pregnancy	59 (15.1)	29 (16.7)	30 (16.7)	
Social support for housework	387 (99.0)	206 (98.6)	181 (99.5)	0.627

Data are mean±SD or n (%), ††; Chi-square test, Missing data were excluded from analysis. ***, $p < 0.001$

†; Mainly breastfeeding includes exclusive or mostly breastfeeding.

‡; Mixed feeding and formula only includes mixed and formula.

Participant's characteristics and Feeding methods at 1 month postpartum

As displayed in Table 2, the mean (SD) age for the categories of mainly breastfeeding and mixed feeding and formula only was 33.0 (5.1) and 33.9 (5.5) years, respectively ($p = 0.085$). Rates of multiparas were significantly higher in the former category than in the latter category (60.5% vs. 38.5%, $p < 0.001$). Rates of mainly breastfeeding were significantly higher at the university hospital (53.6%) than at the private obstetric hospital (40.1%, $p < 0.001$). Postpartum women with an EPDS score < 9 scored significantly higher on mainly breastfeeding than on mixed feeding and formula only (81.4% vs. 65.9%, $p < 0.001$). There were no significant differences in the rates of smoking habits, occupation status, or social support for housework between the 2 groups ($p = 0.10, 0.75$ and 0.63 , respectively).

Factors related to mainly breastfeeding at 1 month postpartum

As presented in Table 3, mothers who preferred mainly breastfeeding while pregnant actually had a higher rate of mainly breastfeeding at 1 month postpartum (adjusted odds ratio [AOR]: 7.73, $p < 0.001$). Additionally, multiparous women (AOR: 1.80, $p = 0.018$) and those with an EPDS score < 9 (AOR: 1.87, $p = 0.024$) also had a higher rate of mainly breastfeeding at 1 month postpartum.

Table 3 Factors affecting the mainly breastfeeding at 1 month postpartum, 1: Mixed and Formula only (n = 182) and 2: Mainly breastfeeding[†] (n = 209)

	Crude OR	CI	P^{\ddagger}	Adjusted OR	CI	P^{\S}
Edinburgh Postnatal Depression Scale (1: ≥ 9 , 2: < 9)	2.27	1.43-3.60	0.001 **	1.87	1.09-3.20	0.024 *
Mothers' preferred feeding methods during pregnancy (1: Mixed and Formula, 2: Mainly breastfeeding [†])	8.38	5.17-13.58	< 0.001 ***	7.73	4.68-12.74	< 0.001 ***
Hospital (1: Private obstetric hospital, 2: University hospital)	2.15	1.44-3.23	< 0.001 ***	1.65	0.98-2.77	0.057
Age (years)	1.03	0.10-1.07	0.086	1.01	0.96-1.06	0.725
Parity (1: Primi, 2: Multi)	2.25	1.63-3.68	< 0.001 ***	1.80	1.11-2.94	0.018 *

[†]; "Mainly breastfeeding: exclusively or mostly breastfeeding", *, $P < 0.05$, **, $P < 0.01$, ***, $P < 0.001$

[‡]; logistic analysis, [§]; multiple logistic analysis among variables in table.

DISCUSSION

This study identified the relative factors of breastfeeding methods and mental health at 1 month postpartum at a university hospital and a private obstetric hospital in the Tokyo metropolitan area, based on the hypothesis that actual feeding methods at 1 month postpartum are associated with the techniques preferred by mothers during pregnancy and low score (< 9) of EPDS. Our results showed that "mainly breastfeeding" as the actual method was also associated with being the preferred method during pregnancy, multiparity, and an EPDS score < 9 .

Although breastfeeding is beneficial for the health of both infants and mothers, about 44% of infants 0–6 months old are exclusively breastfed in the world (World Health Organization, 2021). The rate of exclusive breastfeeding was also 41.1% in our study, which is less than that reported in the National Nutrition Survey on Preschool

Children (51.3%) at 1 month postpartum (Health & Labour, 2015). The reasons were that participants who had a child aged 0 to 2 responded to the following question on breastfeeding in the national survey: "Please state when you started and ended giving your child breast milk, formula, and baby food." Breast milk in this survey was not defined as "only breast milk without any formula." In our study, however, we gave 5 options for feeding methods: (1) exclusively breastfeeding; (2) mostly breastfeeding; (3) mixed-B; (4) mixed-F; and (5) formula only. Therefore, the rate of breastfeeding in the national survey may have been overestimated exclusive breastfeeding more than in our study. In addition, a previous cross-sectional study among Japanese women at 1 month postpartum ($n = 180$) showed that only 40.4% ($n = 72$) of them implemented exclusive breastfeeding (Otsuka et al., 2008). In their study, Otsuka et al. (2008) defined breastfeeding as feeding an infant any breast milk within the past 24 hours. Mothers were grouped into 1 of the following 3 categories: (1) exclusive breastfeeding (i.e., breast milk only); (2) partial breastfeeding (i.e., breast milk and formula); and (3) bottle feeding (i.e., no breast milk at all). Therefore, we may estimate the current breastfeeding rate at 1 month postpartum in Japan to be around 40% from the present and previous studies. Our results suggest that the rate of exclusive breast feeding in Japan lower than in the world. The MHLW (2010) set a goal to increase the exclusive breastfeeding rate at 1 month postpartum to 60%, which healthcare providers and breastfeeding researchers in Japan need to make an effort to achieve.

We revealed that postpartum women who were mainly breastfeeding at 1 month postpartum were associated with EPDS < 9 at 1 month postpartum. A review of 400 studies has shown that early cessation of breastfeeding or not breastfeeding at all is associated with an increased risk of maternal postpartum depression (Ip et al., 2007). A longitudinal study also reported that a high proportion of breastfeeding mothers at 1 month postpartum went on to have an EPDS score of ≥ 9 at 5 months postpartum ($p = 0.01$), around the same time these mothers changed to formula milk-based feeding, unlike those who breastfed both at 1 and 5 months postpartum (Nishioka et al., 2011). Similarly, our results indicated depressive symptoms with an EPDS ≥ 9 to be associated with mixed and formula feeding. Therefore, healthcare providers should pay attention to the relationship between feeding methods and mental health.

We found that postpartum women who were mainly breastfeeding at 1 month postpartum were associated with intention to give exclusive or mostly breastfeed during pregnancy. A previous cross-sectional study in Japan also revealed that supplemented and/or discontinued breastfeeding at 1 month postpartum is associated with no intention to give exclusive breastfeed and a lower breastfeeding self-efficacy, and so on (Otsuka et al., 2008). Therefore, our finding suggests that postpartum women may need psychological support to enhance their breastfeeding self-efficacy and knowledge of breastfeeding from the time of pregnancy so as to be able to give breastfeeding exclusively.

As expected, our findings suggest multiparity to be associated with mainly breastfeeding. Experience in childrearing and breastfeeding influences methods of breastfeeding. In addition, a large study of 53,575 postpartum women demonstrated that exclusive breastfeeding is linked with having a birth attendant and/or nurse, as well as a peer in a childrearing circle (Kaneko et al., 2006). A longitudinal study that examined 640 healthy term newborns between childbirth and 3 months of age reported that the factors that favor breastfeeding include a previous successful breastfeeding experience, mothers with a higher level of education, attending prenatal classes, not using a pacifier, the practice of rooming in, and breastfeeding on demand (Colombo et al., 2018).

Therefore, healthcare providers need to educate primipara women on childrearing, including breastfeeding, to enable them to have a successful breastfeeding experience.

Previous studies have demonstrated that support from the partner and family members can affect successful breastfeeding in postpartum women (Gibson-Davis & Brooks-Gunn, 2007; Sherriff et al., 2014). However, we did not observe any relationship between social support and feeding methods. Instead, further research needs to ask participants separate questions on support for housework, childrearing, and breastfeeding (Chung et al., 2007). Several limitations of this study should be acknowledged. The data regarding the mothers' preferred feeding methods during pregnancy are obtained retrospectively, which could have entailed recall bias. Another investigation indicated that improved breastfeeding knowledge and attitudes toward breastfeeding are related to positive breastfeeding outcomes (Zhang, 2018). Our inability to adjust all variables may have caused our results to be different. In addition, we had set mainly breastfeeding including exclusive breastfeeding as an outcome. Therefore, our results can apply to only women who is mainly breastfeeding but not exclusive breastfeeding (Jessri et al., 2013).

CONCLUSION

The results show that mainly breastfeeding as the actual method used at 1-month postpartum is associated with an intent to do so during pregnancy, multiparity, and an EPDS score < 9. This study recommends that healthcare providers pay attention to the relationship between feeding methods and mental health. Further research is needed to identify effective care for women who desire to breastfeed exclusively.

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