
RESEARCH REPORT

Factors associated with the discontinuation of breastfeeding until 3 months after delivery

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Abstract Study Purpose : The purpose of this study was to calculate the degree of the influences of factors affecting the discontinuation of breastfeeding until 1 month after delivery on that until 3 months after delivery, and to identify indicators of the discontinuation of breastfeeding until 3 months.

Methods : The subjects were 60 mothers who delivered a single infant and initiated breastfeeding in an early puerperal stage after full-term vaginal delivery.

As possible indicators of breastfeeding until 3 months after delivery, 3 breast morphological factor variables ("nipple morphological abnormalities : flat nipples, true inverted nipples, and large nipples ≥ 17 mm in diameter", "nipple fissures", and "mammary gland tissue thickness ≤ 21 mm") and 5 factors (bleeding volume at delivery, birth weight, the absence of breastfeeding in the last child, a smoking habit, and the absence of breastfeeding at discharge) were surveyed.

The 8 factors were surveyed at the time of puerperal discharge. The continuation of breastfeeding 3 months after delivery was ascertained by telephone.

The degree of the influences of each factor on the milk feeding form was analyzed by Fisher's exact method and logistic regression analysis.

Results and conclusion

Factors affecting the milk feeding form 3 months after delivery

Among the 8 possible factors leading to the discontinuation of breastfeeding, the absence of breastfeeding at discharge (Fisher $p=0.003$) alone compared with its presence resulted in mixed/ bottlefeeding 3 months after delivery. The odds ratio of each factor in the mother/child was 1.931 for the thickness of mammary gland tissue, 1.677 for bleeding volume at delivery, 2.502 for the absence of breastfeeding in the last child, and 7.337 for the absence of breastfeeding at discharge. By logistic regression analysis, only the absence of breastfeeding at discharge was correlated with mixed/bottlefeeding 3 months after delivery (odds ratio, 7.337 ; $p=0.017$).

These results suggest that the absence of breastfeeding at discharge is an indicator of the discontinuation of breastfeeding until 3 months after delivery.

Key words : basic conditioning factors, breastfeeding, 3 months after delivery, limitation factors

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Introduction

The purpose of this study was to calculate the degree of the influences of factors affecting the discontinuation of breastfeeding until 1 month after delivery (Haku2005)¹⁾ on that until 3 months after delivery, and to identify indicators of the discontinuation of breastfeeding until 3 months.

Breastfeeding, with many advantages for the mother and child, has been universally promoted. There have been various studies on the continuation of breastfeeding. Previous studies on mother's milk and breastfeeding can be classified into "surveys of physical/psychological/social factors inhibiting the continuation of breastfeeding"²⁻⁶⁾, "clarification of the structure and function of the breast and mammary gland"^{7,8)}, "studies on scientific/psychosocial advantages of mother's milk"⁹⁾, "evaluation of the effectiveness of care for breastfeeding"¹⁰⁻¹³⁾, and "development of scales associated with breastfeeding"¹⁴⁻¹⁶⁾.

Based on these previous studies, Haku (2003¹⁷⁾, 2005¹⁾) surveyed factors leading to the limitation factors of breastfeeding in terms of psychological/social factors, breast morphological factors, and *basic conditioning* factors, and clarified 22 items in the 3 categories of breastfeeding.

We surveyed and analyzed psychological/social factors leading to the discontinuation of breastfeeding before 3 months after delivery using a questionnaire. As a result, 13 items of 4 factor models ("lack of knowledge/experience", "lack of leisure time", "lack of eagerness for breastfeeding", and "lack of adequate awareness of lactation") were associated with the discontinuation of breastfeeding before 1 month after delivery. In this study, though we asked the subjects to answer a questionnaire, its recovery rate was low. Therefore, analysis using these factors was avoided.

Concerning breast morphological factors, 70-80% of the subjects with nipple morphological abnormalities (flat nipples, true inverted nipples, and large nipples ≥ 17 mm in diameter) or nipple fissures were using mixed/bottle-feeding 1 month after delivery. The thickness of mammary gland tissue significantly differed between the

breastfeeding group and mixed/bottlefeeding group. The mean thickness of mammary gland tissue at discharge in all subjects was 21.3 ± 5.3 mm. According to the feeding method, the thickness of mammary gland tissue 1 month after delivery was 22.4 ± 5.3 mm in the breastfeeding group and 20.2 ± 5.0 mm in the mixed/bottlefeeding group, showing a significant difference between the two groups ($t=2.14$, $p=0.035$). Based on these results, the cut-off point of the thickness of mammary gland tissue was determined to be 21 mm based on the similarity between the sensitivity and specificity and the mean value of 21.3 mm in all the subjects, and the thickness was analyzed as a possible factor of the discontinuation of breastfeeding.

As basic conditioning factors, those reported^{6,8)} to affect breastfeeding in the literature were statistically analyzed. As a result, 5 possible basic conditioning factors of the discontinuation of breastfeeding (bleeding volume at delivery ≥ 500 ml, birth weight $< 2,500$ g, the absence of breastfeeding in the last child, the absence of breastfeeding at discharge, and a smoking habit) were analyzed.

In this study, based on the above results, we calculated the degree of the influences of the breast morphological factors and basic conditioning factors (8 factors in the 2 categories) as possible indicators of the discontinuation of breastfeeding on the milk feeding form.

Methods

1) Survey methods

As possible indicators of the discontinuation of breastfeeding until 3 months after delivery, 3 breast morphological factor variables ("nipple morphological abnormalities: flat nipples, true inverted nipples, and large nipples ≥ 17 mm in diameter", "nipple fissures", and "mammary gland tissue thickness ≤ 21 mm") and 5 *basic conditioning* factors (bleeding volume at delivery, birth weight, the absence of breastfeeding in the last child, a smoking habit, and the absence of breastfeeding at discharge) were surveyed.

The 8 factors were surveyed at the time of puerperal discharge. The continuation of breastfeeding 3 months

after delivery was ascertained by telephone.

The thickness of mammary gland tissue was measured on the lateral side of the breast centering on the nipple contralateral to the dominant arm using an ultrasonic diagnostic system (LP probe at 7.5 MHz) (RT-FINO, Yokogawa Medical, Tokyo, Japan) after breast-feeding on the day before discharge (4 or 5 days after delivery). The nipple state was evaluated by observation and measurement.

Data on the 3 *basic conditioning* factors (bleeding volume at delivery, birth weight, and the absence of breast-feeding at discharge) were obtained from delivery records, and data on the absence of breastfeeding in the last child and the smoking habit were obtained by an interview of the subjects.

2) Analysis method

For the analysis of the influences of each factor on the breastfeeding form at 3 month after delivery, significant differences were evaluated by Fisher's exact method and the χ^2 method. In addition, the degree of the influences of the factors as a whole was calculated by logistic regression analysis using the milk feeding form at 3 months after delivery as explanatory variables and the 5 possible factors of the discontinuation of breastfeeding as independent variables.

3) Subjects of survey

The subjects were 60 mothers who delivered a single infant and initiated breastfeeding in an early puerperal stage after full-term vaginal delivery.

4) Survey institution

This survey was performed in an institution in a local city where the annual number of deliveries is about 400, and the WHO's "Ten Steps to Successful Breastfeeding" are performed.

5) Survey period

Between April 2004 and January 2005

6) Ethical considerations

Researchers gave both oral and written explanations

of the study to individual subjects and requested cooperation in the study, telling them that obtained information would be strictly stored and managed, individual subjects would not be identified, and the presence or absence of consent would not affect subsequent care. The approval of the ethical committee of the research institution for this study was obtained.

Results

1) Characteristics of subjects (Table 1)

The mean age of the subjects was 30.9 ± 4.7 years (Range 19-41), which was about 1-year higher than the mean delivery age of mothers in Japan in fiscal 2002 (29.8 years)²¹⁾. Thirty-two mothers (53.3%) did not have childcare experience, while 28 mothers (46.7%) had such experience.

Nipple morphological abnormalities were observed in 3 mothers (5.0%), nipple fissures in 7 mothers (11.7%), and a mammary gland thickness ≤ 21 mm in 33 mothers (55.0%).

Bleeding volume at delivery ≥ 500 ml was observed in 19 mothers (31.7%), birth weight $< 2,500$ g in 3 mothers (5.0%), the absence of breastfeeding in the last child in 18 mothers (30.0%), a smoking habit in 4 mothers (6.7%), and the absence of breastfeeding at discharge in 17

Table 1 Characteristics of subject (n=60)

Age (Mean \pm SD)	30.9 \pm 4.7years
Childcareing Without childcare experience	32cases (53.3%)
With childcare experience	28cases (46.7%)
Abnormalities of the nipple	3cases (5.0%)
Nipple fissures	7cases (11.7%)
Mammary gland tissue at discharge : ≤ 21 mm	33cases (55.0%)
Bleeding volume : ≥ 500 ml	19cases (31.7%)
Birth weight : < 2500 g	3cases (5.0%)
Absence of breastfeeding in the last child	18cases (30.0%)
Smoking habit	4cases (6.7%)
Absence of breastfeeding at discharge	17cases (28.3%)
1 month after delivery Breastfeeding	33cases (55.0%)
Mixed/Bottlefeeding	27cases (45.0%)
3 month after delivery Breastfeeding	26cases (43.3%)
Mixed/Bottlefeeding	34cases (56.7%)

mothers (28.3%).

One month after delivery, the breastfeeding group consisted of 33 mothers (55.0%), and the mixed/bottle-feeding group consisted of 27mothers (45.0%). Three months after delivery, the breastfeeding group consisted of 26 mothers (43.3%), and the mixed/bottle-feeding group consisted of 34 mothers (56.7%).

2) Factors at discharge affecting the breastfeeding form 3 months after delivery (Table 2 , Table 3)

Among the 8 possible factors of the discontinuation of

breastfeeding, only the absence of breastfeeding at discharge (Fisher $p=0.003$) compared with its presence resulted in mixed/bottlefeeding 3 months after delivery.

The degree of influences was analyzed by logistic regression analysis using the milk feeding form (breast-feeding, 0 ; mixed feeding, 1) 3 months after delivery as explanatory variables and 5 maternal/child factors after excluding factors showing a few cases (nipple morphological abnormalities, birth weight, and the smoking habit) as independent variables. The odds ratio of each factor in the mother/child was 1.931 for the thickness of

Table 2 The degree of the influence of each factors (Fisher) n=60

	3 month after delivery		χ^2	p
	Breastfeeding	Mixed/ Bottlefeeding		
Normalities of the nipple	26	31		Fisher 0.175
Abnormalities of the nipple	0	3		
Non Nipple fissures	25	28		Fisher 0.104
Nipple fissures	1	6		
Mammary gland tissue at discharge >21mm	15	12	2.98	0.084
Mammary gland tissue at discharge \leq 21mm	11	22		
Bleeding volume <500ml	19	22	0.47	0.490
Bleeding volume \geq 500ml	7	12		
Birth weight \geq 2500g	25	32		Fisher 0.601
Birth weight <2500g	1	2		
Breastfeeding in the last child	21	21		Fisher 0.095
Absence of breastfeeding in the last child	5	13		
Non Smoking habit	26	30		Fisher 0.095
Smoking habit	0	4		
Breastfeeding at discharge	24	20		Fisher 0.003*
Absence of breastfeeding at discharge	2	14		

* $p<0.01$

Table 3 The degree of the influence of each factors (logistic regression analysis) n=60

	Odds ratio	95% C.I	p
Mammary gland tissue at discharge \leq 21mm	1.931	0.609-6.123	0.264
Bleeding volume \geq 500ml	1.677	0.471-5.966	0.425
Absence of breastfeeding in the last child	2.502	0.663-9.438	0.176
Absence of breastfeeding at discharge	7.337	1.437-37.453	0.017*

* $p<0.05$

mammary gland tissue, 1.677 for bleeding volume at delivery, 2.502 for the absence of breastfeeding in the last child, and 7.337 for the absence of breastfeeding at discharge. By logistic regression analysis, only the absence of breastfeeding at discharge (odds ratio, 7.337; $p=0.017$) was correlated with mixed/bottlefeeding 3 months after delivery.

Discussion

The infant nutritional statistics in fiscal 2005 showed a breastfeeding rate of 42.3% and a mixed/bottlefeeding rate of 57.6% 1 month after delivery and a breastfeeding rate of 38.0% and a mixed/bottlefeeding rate of 62.0% 3 months after delivery. The breastfeeding rates 1 month and 3 months after delivery in this study were 55.0% (33 mothers) and 43.3% (26 mothers), respectively, being higher than those in the 2005 statistics.

Of the 3 breast morphological factor variables and 5 *basic conditioning* factors, only “the absence of breastfeeding at discharge” was a factor affecting breastfeeding until 3 months after delivery. “Ten Steps to Successful Breastfeeding”⁹⁾ proposed that childcare only by breastfeeding during hospitalization is important. Our results suggest that this article is associated with breastfeeding until 3 months after birth.

Other factors, bleeding volume at delivery and the thickness of mammary gland tissue to be associated with breast milk secretion, there became little influence with the temporal course. Nipple fissures and abnormalities of the nipple were improved or when with a little influence, it is thought by improvement of a breastfeeding action. However, by this study, only the person who was a breastfeeding is not investigated in 1 month after delivery. Therefore other factors cannot judge when influence decreased since.

Care during the short period from delivery to discharge may be the key for the continuation of breastfeeding. Practical care to increase mothers' confidence³⁾ in breastfeeding may be important. Mothers' feeling of breastfeeding being burdensome may be reduced not only by enhancing the eagerness for and positive view of breastfeeding, but also by care to adequately increase

awareness of lactation. For this, not only the efforts of caregivers but also mothers' self-care is important. For the continuation of breastfeeding, mothers and their families and expert care providers should understand breastfeeding discontinuation factors and make efforts to eliminate or reduce these factors during the pregnancy/delivery/puerperal periods.

The infant nutritional statistics in fiscal 2005 reported by the Ministry of Health, Labour and Welfare showed a gradual decrease in bottlefeeding. A survey of the practice status of the WHO's “Ten Steps to Successful Breastfeeding” showed low practice rates (“placement of the mother and child in the same room from immediately after delivery”, 17%; “breastfeeding within 30 minutes after delivery”, 32%; “breastfeeding whenever the infant wishes”, 53%) and necessity for an increase in support in delivery institutions.

In the future, further surveys of the effectiveness of care during puerperal hospitalization are necessary.

Conclusion

The results of this study suggest that the absence of breastfeeding at discharge is an indicator of the discontinuation of breastfeeding until 3 months after delivery.

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