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## Evaluation of the breast-feeding limitation scale as a useful tool for prediction of continuing breast-feeding

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**Abstract Purpose :** The purpose of this study was to develop a questionnaire for gathering information about the factors restricting the continuation of breast-feeding at the time of discharge from the maternity hospital after childbirth. As a first step, a statistical analysis was conducted regarding the predictability at the time of hospital discharge of the breast-feeding limitation factors which were collected during a survey at the health checkup 1 month after childbirth.

**Methods :** The information regarding the factors limiting breast-feeding, gathered from mothers who could not continue breast-feeding at one month after childbirth, was analyzed using the dependent-care model proposed by Orem, a nursing theoretician. Based on the analysis results, a questionnaire consisting of 36 items 4 point Likert-type scale was prepared. This draft questionnaire was pre-tested, and finally a questionnaire consisting of 30 items ( $\alpha$  coefficient=0.81) was prepared.

Using the re-testing method, an examination was undertaken to see the extent to which the limitation factors gleaned through the questionnaire survey can be predicted at the time of hospital discharge. The subjects were 70 mothers who had experienced rooming-in upon normal delivery. The survey was conducted twice : at the time of hospital discharge and at the time of the health checkup 1 month after delivery.

**Results :** 1. Regarding the prepared questionnaire, the correlation between items was determined through the re-test method, according to which the subjects were surveyed at the time of hospital discharge and at the time of the health checkup 1 month after delivery. As a result, an extremely strong correlation, that is, 0.9 or upward, was observed in 1 item of the questionnaire survey, a strong correlation, that is, 0.7 or upward, was observed in 5 items, and no correlation was observed in 8 items.

2. The constructive concept of the questionnaire survey at the time of hospital discharge was analyzed based on the 22 for which there was a strong or extremely strong correlation ; the other 8 items for which no correlation was observed were left out. After 3 varimax rotations, a model with 13 items and 4 factors was verified. Cronbach's  $\alpha$  coefficient for the entire questionnaire was 0.81, and that for the subscale ranged from 0.58 to 0.83.

3. The correlation between the questionnaire scores at the time of hospital discharge and at the time of the health checkup 1 month after delivery was 0.65 ( $p<0.0001$ ) for the entire questionnaire, while that for the subscale ranged from 0.37 ( $p=0.0015$ ) to 0.76 ( $p<0.0001$ ).

4. The mean score of the breast-feeding group and that of the mixed-feeding group at the time of the health checkup 1 month after delivery were  $27.3\pm 7.0$  and  $31.7\pm 6.8$ , respectively ; that is, a significant difference ( $p<0.05$ ) was observed between the two groups. It has been found that the mixed-feeding group has more factors limiting breast-feeding in comparison with the breast-feeding group, and it has been suggested that the information gathered by the questionnaire can indeed constitute a

firm basis for predicting difficulties in continuing breast-feeding.

**Conclusion** : Some of the limitation factors discovered at the time of the health checkup 1 month after delivery could be predicted at the time of hospital discharge ; thus, it has been suggested that those limitation factors can be included in a questionnaire survey on factors limiting breast-feeding. The questionnaire to be filled out at the time of hospital discharge after childbirth will be prepared upon further review of its reliability and validity. We expect that the questionnaire will constitute a firm basis for predicting the presence of factors limiting breast-feeding already at the time of hospital discharge, will help staff evaluate the feasibility of self-care, which is said to be necessary for puerperal women, and will help staff elucidate the necessity of nursing-care intervention.

**Key words** : breast-feeding, limitation factors, dependent-care, Orem's theory, breast-feeding limitation scale

## Introduction

There are numerous books and papers on breast-feeding. Various papers have elucidated the factors affecting the continuation of breast-feeding, but they are somewhat different by country. The authors have analyzed the factors limiting breast-feeding using the dependent-care model<sup>1)</sup> proposed by Orem, a nursing theoretician. Based on the results, the author has attempted to create a Breast-Feeding Limitation Scale (hereafter BFLS). Up to now, no questionnaire for examining the factors limiting breast-feeding has been developed. The authors have considered it necessary to develop such a questionnaire in order to identify the women who might restrict or discontinue breast-feeding, and in order to characterize the limitation factors involved.

The purpose of this study was to develop a questionnaire for gathering information about the factors restricting the continuation of breast-feeding at the time of discharge from the maternity hospital after childbirth. As a first step, a statistical analysis was conducted regarding the predictability at the time of hospital discharge of the breast-feeding limitation factors which were collected during a survey at the health checkup 1 month after childbirth. Pinpointing the presence and specific nature of the factors limiting breast-feeding at

the time of hospital discharge will help staff to evaluate the self-care potential of puerperal women, which is considered necessary to the well-being of both mother and child, and will help staff elucidate the necessity of nursing-care intervention, enabling the active support of breast-feeding, which decreases to some 44% (statistics in 2000) 1 month after childbirth.

## Methods

### 1. Preparing the draft questionnaire used in examining the factors limiting breast-feeding

A first questionnaire consisting of 36 items was prepared based on the factors limiting breast-feeding, constructed as a result of an analysis using Orem's dependent-care deficit. The response to each item was allocated a scale from 1 to 4. The form of response was an alternative system comprised of the following four choices: yes; sort of yes; sort of no; no. This questionnaire consisting of 36 items was pre-tested on 45 mothers at 1 month after childbirth, and 3 items, with a correlation of 0.7 or more, were removed from the questionnaire. Furthermore, 3 items, with a mean score of 1.5 or below, for which no significant difference was observed between the breast-feeding group and the mixed-feeding group, were removed from the questionnaire. Thus, a second questionnaire consisting of 30 items was prepared. Cronbach's  $\alpha$  coefficient of the 30-item questionnaire is 0.81. Regarding the mean result score for this questionnaire, a significant difference

2004年11月30日受理

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( $p < 0.0001$ ) was observed between the breast-feeding group and the mixed-feeding group at the health checkup 1 month after child delivery.

## 2. The subjects and period of this study

The subjects used in this study were 70 mothers who experienced rooming-in and easy monotonous deliveries. The questionnaire survey was conducted twice in total, that is, once at the time of hospital discharge and once at the time of the health checkup 1 month after child delivery. The study period was from February to December 2003, and the study was conducted in tertiary medical institutions of local cities with annual childbirths of about 400 cases.

## 3. Ethical considerations

The purpose and meaning of the survey were explained to the subjects beforehand in writing, and upon obtaining the consent of the subjects, the survey was conducted. In the written explanation, the following points were explicitly stated and explained: the cost burden, the advantages and disadvantages of taking part in the study, the protection of individual information, the fact that there will be no repercussions even if they choose not to take part in or to withdraw from the study at any given moment. The data obtained in the survey were kept strictly confidential.

## 4. Method of analysis

Regarding the prepared questionnaire, the correlations between items were determined and the constructive concept was analyzed by means of factor analysis. To determine the significance of differences between groups and correlation, we used unpaired t-test, chi-square test and Pearson correlation coefficient. Statistical significance set at  $p < 0.05$ .

All statistical analyses were performed using SPSS for Windows (version 11.5J).

## Results

### 1. The relation between the background of each subject and breast-feeding (Table 1)

Table 1-1). The backgrounds of the subjects and the percentage of each child-raising group (n=70)

Age (Mean $\pm$ SD)	30.9 $\pm$ 5.0	
Child-raising experience (CRE)	Without past CRE	41 cases (58.6%)
	With past CRE	29 cases (41.4%)

Table 1-2). Breast-feeding rate

	Breast-feeding N(%)	Mixed-feeding N(%)
Hospital discharge	52 (74.3%)	18 (25.7%)
1 month after delivery	29 (41.4%)	41 (58.6%)

Table 1-3). Breast-feeding rate at hospital discharge

	Breast-feeding N(%) (n=52)	Mixed-feeding N(%) (n=18)	$\chi^2$ test (2 $\times$ 2) p-value
Without past CRE	29 (70.7%)	12 (29.3%)	0.419
With past CRE	23 (79.3%)	6 (20.7%)	

Table 1-4). Breast-feeding rate at 1 month after delivery

	Breast-feeding N(%) (n=29)	Mixed-feeding N(%) (n=41)	$\chi^2$ test (2 $\times$ 2) p-value
Without past CRE	17 (41.5%)	24 (58.5%)	0.994
With past CRE	12 (41.4%)	17 (58.6%)	

The mean age of the mothers was 30.9  $\pm$  5.0 years old (the mean age of the women who give birth to children annually in this institution: 30.2  $\pm$  4.4 years old), whereas the mean age of Japanese women who gave birth to children in fiscal 2002 was 29.6 years old; that is, the age group of the subjects was higher by about 1 year than that of the average Japanese woman giving birth.

Regarding the feeding pattern at the time of hospital discharge, there were 52 (74.3%) subjects feeding their babies only breast milk (hereafter called "the breast-feeding group") and 18 (25.7%) subjects feeding their babies a mixed feeding and artificial feeding (hereafter called "the mixotrophy-feeding group"). Regarding the feeding pattern at the time of the medical checkup 1

month after child delivery, the breast-feeding group had 27 (41.4%) subjects and the mixed-feeding group had 41 (58.6%) subjects. The breast-feeding ratios of the subjects of this study were similar to those of the infantile nutrition statistics in fiscal 2000 (for 1-2 months of age, breast-fed infants accounted for 44.8%, while infants fed a mixed feeding and artificial feeding accounted for 55.2%).

The subjects were classified according to whether or not they had past child-raising experience. The group without past child-raising experience had 41 (58.6%) subjects, while the group with past child-raising experience had 29 (41.4%) subjects. As for the relation between past child-raising experience and breast-feeding at the time of hospital discharge, in the group without past child-raising experience, 29 subjects (70.7%) were breast-feeding their infants and 12 (29.3%) were feeding them the mixed-feeding group, while in the group with past child-raising experience, 23 subjects (79.3%) were breast-feeding their infants and 6 (20.7%) were feeding them the mixed-feeding group;

that is, no significant difference by chi-square test in the feeding pattern was observed between the groups with and without past child-raising experience.

As for the relation between past child-raising experience and breast-feeding at the time of the health checkup 1 month after childbirth, in the group without past child-raising experience, 17 subjects (70.7%) were breastfeeding their infants and 24 (29.3%) were feeding them the mixed-feeding group, while in the group with past child-raising experience, 12 subjects (79.3%) were breast-feeding their infants and 17 (20.7%) were feeding them the mixed-feeding group; that is, no significant difference by chi-square test in the feeding pattern was observed between the groups with and without past child-raising experience.

## 2. Correlation coefficients between item scores (Table 2)

The same questionnaire survey was conducted twice with the same subjects at an interval of about 1 month, and the correlation coefficients between the item scores were determined, in order to analyze the usefulness of

Table 2. The itemized correlation between the survey results at the time of hospital discharge and at 1 month after childbirth

Items		All subjects	Without past CRE	With past CRE
		r	r	r
Q 1	I have no idea what to do because this is my first child-raising experience	0.806***	0.570***	-0.261
Q 2	I have no idea why my baby is crying.	0.698***	0.539**	0.289
Q 3	I have no idea if my baby is taking in enough breast milk.	0.693***	0.411**	0.862***
Q 4	I have no idea what to do to have plenty of milk.	0.463***	0.543**	0.281
Q 5	I thought that my baby would fall asleep after sucking the breast.	0.330**	0	0.668***
Q 6	I don't think that I have plenty of milk because my breast is not swollen.	0.398**	0.502**	0.342
Q 7	My baby cries a lot even after taking in breast milk.	0.233	0.068	0.399*
Q 8	My baby tends to grizzle upon taking in breast milk.	0.378**	0.313*	0.514**
Q 9	I suppose that cow milk is more nutritious than my breast milk.	0.187	0.717***	-0.404*
Q 10	I become nervous when my baby cries.	0.524***	0.353*	0.847***
Q 11	I am afraid that my breast milk is not enough to feed my baby.	0.395**	0.620***	0.250
Q 12	I am nervous about the weight gain of my baby.	0.161	0.193	0.077
Q 13	My breasts were dry the last time as well.	0.928***	—	0.915***
Q 15	I won't stick to breast milk because I raised my older child on artificial milk.	0.728***	—	0.615**
Q 16	Because I've heard that the body weight of the baby won't increase with only breast milk, I intend to give my baby artificial milk as well.	0.121	0.245	-0.370
Q 17	Since I will soon go to work, I won't continue to raise my child with breast milk.	0.713***	0.687***	0.770***
Q 19	I suppose I don't have plenty of milk.	0.324**	0.038	0.700***

Q20	Breast milk cannot be fed to my baby by anyone other than myself, but artificial milk can be fed to the baby by anyone, so artificial milk is more convenient.	0.800***	0.851***	0.736***
Q21	I won't stick to breast-feeding (artificial milk is also all right).	0.653***	0.662***	0.696***
Q23	Breast-feeding at night makes me very tired, so I prefer to feed my child artificial milk instead.	0.679***	0.545**	0.873***
Q24	Since I take care of my child, I don't have enough physical strength to breast-feed easily.	0.802***	0.698***	0.733***
Q25	I suppose stress will build up, because I spend all day with my child.	-0.365**	-0.305	-0.454*
Q26	I suppose it will be difficult for me because no one will help me with the household chores	0.133	0.347*	-0.024
Q28	I suppose I will always be busy with household chores and child-raising, and will not be able to get enough rest.	0.548***	0.480**	0.580**
Q29	People around me say that my baby cries due to the insufficient amount of breast milk I feed it.	0.413**	0.467**	0.494**
Q30	Those who help me (my mother, my mother-in-law, etc.) after childbirth don't stick to breast-feeding (artificial milk is all right to them).	0.500***	0.402**	0.553**
Q32	I also have to take care of my husband.	0.336***	0.629***	0.334
Q33	My husband will not (cannot) help me with the child-raising because he is busy working.	0.418**	0.392*	0.460*
Q35	I cannot let my child suckle at my breast due to a breast disorder (flat nipples, depressed nipples, short nipples or large nipples).	0.226	0.244	-0.115
Q36	I cannot let my child suckle at my breast due to severed nipples.	0.537***	0.483**	0.804***
Correlation between the 30-item total scores :				
30 items (Q14, 18, 22, 27, 31, 34: delete by pre-test)		0.676***	0.529**	0.780***

CRE: Child-bearing Experience

Pearson correlation coefficient \*p<0.05 \*\*p<0.01 \*\*\*p<0.0001

the survey at hospital discharge.

The results thereof showed 1 item with an extremely strong correlation of  $p < 0.0001$ , 5 items with a strong correlation of  $p < 0.01$ , and 8 items with no correlation.

The correlation by item was calculated according to the presence or absence of child-raising experience. For the group without past child-raising experience, there were 2 items with a strong correlation and 4 items without correlation. For the group with past child-raising experience, there was 1 item with an extremely strong correlation, there were 8 items with a strong correlation, and 3 items without correlation.

### 3. The constructive concept and its reliability (Table 3)

Regarding the constructive concept of the questionnaire survey conducted at the time of hospital discharge, 22 out of 30 items after eliminating the 6 items

lacking any correlation between items were analyzed through principal component analysis and 2 items of with past child-bearing experience and varimax rotation. After three varimax rotations, a model consisting of 13 items and 4 factors was verified.

The first factor was called "the deficit of knowledge or experience," the second factor was called "the deficit of latitude," the third factor was called "the deficit of desire to feed one's own baby breast milk" and the fourth factor was called "the deficit of adequate perception of breast milk secretion." Regarding these factors, Cronbach's  $\alpha$  coefficient of the entire questionnaire was 0.81, and each subscale ranged from 0.58 to 0.83.

### 4. Clinical validity (Table 4, 5)

The correlation between the scores of the questionnaire was determined again using the model consisting

Table 3 . The result by varimax-rotated factor analysis of BFLS scores (N=70)

		Factor 1	Factor 2	Factor 3	Factor 4	Communi- nality	Cron- bach's $\alpha$
Factor 1 Defect of knowledge or experience	2) I have no idea why my baby is crying. 3) I have no idea if my baby is taking in enough breast milk. 4) I have no idea what to do to have plenty of milk.	.776 .767 .712			.628 .685 .602		.829
Factor 2 Defect of latitude	32) I also have to take care of my husband. 33) My husband will not (cannot) help me with the child-raising because he is busy working. 28) I suppose I will always be busy with household chores and child-raising, and will not be able to get enough rest. 25) I suppose stress will build up, because I spend all day with my child. 8) My baby tends to grizzle upon taking in breast milk.		.639 .611 .593 .459 .448			.413 .427 .420 .531 .452	.714
Factor 3 Defect of desire to breast- feeding	21) I won't stick to breast-feeding (artificial milk is also all right). 17) Since I will soon go to work, I won't continue to raise my child with breast milk. 23) Breast-feeding at night makes me very tired, so I prefer to feed my child artificial milk instead.			.764 .700 .600		.671 .580 .432	.731
Factor 4 Defect of adequate perception of breast milk secretion	6) I don't think that I have plenty of milk because my breast is not swollen. 11) I am afraid that my breast milk is not enough to feed my baby.				.608 .454	.447 .491	.578
	Eigenvalue	4.15	1.88	1.50	1.11		.814
	Factors propotion (%)	31.94	14.48	11.57	8.57		
	Cumlat proportion (%)	31.94	46.42	57.99	66.56		

of 13 items and 4 factors. It was 0.65 for the entire questionnaire, and ranged from 0.37 to 0.76 for the subscale (Table 4).

The relation between the overall score of the questionnaire (a model consisting of 13 items and 4 factors at the survey conducted at the time of hospital discharge) and the feeding pattern at the time of the health checkup 1 month after childbirth was examined (Table 5). The scores of the questionnaire consisting of 13 items ranged from 13-52 points, and the result scores for the subjects ranged from 14 to 44. The overall mean

score was  $29.6 \pm 7.1$ , the mean score for the breast-feeding group at the time of the health checkup 1 month after childbirth was  $27.3 \pm 7.0$ , and the mean score for the mixed-feeding group was  $31.7 \pm 6.8$ ; that is, a significant difference ( $p < 0.05$ ) was observed between the two groups. The mixed-feeding group showed more factors limiting breast-feeding in comparison with the breast-feeding group.

Table 4. The factors correlation between the survey results at the time of hospital discharge and at 1 month after childbirth

Factors	r
Factor 1 Defect of knowledge or experience	0.763***
Factor 2 Defect of latitude	0.370
Factor 3 Defect of desire to breast-feeding	0.717***
Factor 4 Defect of adequate perception of breast milk secretion	0.528***
Factor 1 ~ 4	0.652***

Pearson correlation coefficient \*\*\*p<0.0001

Table 5. Comparison of BFLS scores between Breast-feeding and Mixed-feeding group

	Breast-feeding (n=29) (mean±SD)	Mixed-feeding (n=41) (mean±SD)	unpaired t-test p-value
Mean score of 1 month after childbirth	27.3±7.0	31.7±6.8	0.018

All subjects mean score is 29.6±7.1

## Discussion

Information regarding the factors limiting breast-feeding gathered from the mothers during the survey conducted at the time of the health checkup 1 month after child delivery was also gathered from mothers at the time of hospital discharge in order to analyze the predictability of factors limiting breast-feeding. The results showed that 8 factors limiting breast-feeding could not be predicted at the time of hospital discharge. They were factors which could not be predicted during the mother's 5-day stay at the hospital after childbirth, expressed in statements such as "I thought that babies would fall asleep after sucking the breast" or "It was difficult for me because no one helped me with the household chores." Also, after hospital discharge there appeared factors which were the result of experience, expressed in statements such as "I was nervous about the weight gain of the child," "I heard that the weight of the child would not increase only with breast milk" and "I could not feed my baby with breast milk due to a breast disorder." Therefore, we considered that the prediction of continued breast-feeding or factors limiting

breast-feeding would not be entirely feasible if the questionnaire used in the survey at the time of hospital discharge was exactly the same as the questionnaire used in the survey at the time of the health checkup 1 month after childbirth. Those items with low correlation coefficients between the item scores in the two surveys were removed, because we deemed the relevant limitation factors unpredictable at the time of hospital discharge, and after three varimax rotations, a model consisting of 13 items and 4 factors was determined.

For the designation of the factors, the term "deficit," which was used by Orem with respect to "factors limiting self-care," was used. The first factor was called "the deficit of knowledge or experience," the second factor was called "the deficit of latitude," the third factor was called "the deficit of desire to feed one's own baby breast milk" and the fourth factor was called "the deficit of adequate perception of breast milk secretion." In earlier literature, Dennis, C.M.<sup>2)</sup> had commented on the first factor, "deficit of knowledge or experience," as follows: "Dependent care is carried out by people with professional competence and learned in sociocultural circumstances." It can be said that dependent care is carried out based on knowledge and/or experience. The second factor, "deficit of latitude," included matters described by Orem as "factors limiting self-care,"<sup>3)</sup> that is, "deficit of support," "stress" and "interference from family members or others." Also, in many earlier studies in Japan, "the baby's cry" is listed as a factor prompting the mother to feed her baby more milk. The third factor, "the deficit of desire to feed one's own baby breast milk," and the fourth factor, "the deficit of adequate perception of breast milk secretion," appear in connection with self-efficacy<sup>4)5)</sup> and indicate diffidence in breast-feeding. These four factors were considered to be the factors predicting the interruption of breast-feeding after hospital discharge.

Taylor, S. G.<sup>6)</sup> reported that the dependent-care agent played the dual roles of self-care and dependent care. These four factors show the characteristics of the mother, who is a dependent-care agent, while at the same time meeting self-care requisites in order to ensure her own physical and mental well-being, with

meals for herself, sleep and rest, so that she gives her breast to her own baby without stress while providing her baby dependent care. Thus, authors think that the mother should coordinate the actions necessary for the execution of dependent care with those necessary for her own care.

### Conclusion

It has been shown that the questionnaire aimed at pinpointing the factors limiting breast-feeding prepared in this study is in conformity with Orem's dependent-care theory, and can be used to predict the continuation or discontinuation of breast-feeding at the time of the health checkup 1 month after childbirth. However, the internal consistency of the fourth factor is  $\alpha=0.578$ , or low. Accordingly, further improvement in the reliability and validity of the questionnaire should be pursued.

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