

The Effect of Maternal Breast-Feeding in Japanese Mothers: Focusing on Maternal Touch to Infants, Depression, and Child Rearing Stress

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The purpose of this study is: (1) to examine how the touch to infants would differ depending on feeding methods including breast-feeding mothers (BR), mixed-feeding mothers (M), and bottle-feeding mothers (BO), (2) to examine how maternal depression and child rearing stress would differ depending on the three feeding methods.

A total of 699 mothers of four-month-old infants completed a questionnaire, including a touch rating scale, maternal depression, child rearing stress.

The major results indicated that BR more frequently used the playful touch in playing scenarios than M. Additionally, BR and M more frequently used the instrumental touch for feeding than BO. BO more frequently used the intrusive touch in crying scenarios and during sleep scenarios than M. In addition, child-related child rearing stress in BO was significantly higher than those of BR and M.

This study suggested that Breast-feeding increased interaction using touch between parents and infant, and decreased child-related rearing stress.

key words: breast-feeding, maternal touch to infant, depression, child rearing stress

Introduction

In recent years, many problems such as child abuse, anxiety, and social isolation over child-rearing have been recognized in Japan. The actual conditions of child rearing have been changed significantly within two decades. For example, it is said that, compared to twenty years ago, there has been an increase in the number of mothers who have grown up without having experience with infants and therefore have anxiety, irritation, and difficulty with child rearing (Harada, Yamano, Nakagawa, Hashimoto, Kumoi, Kako, Ono, Kameoka, Kato, & Hattori, 2004). In order to prevent generational transmission of abuse, we believe that helping infants and mothers to construct parent-child relationships are essential.

Touch between parents and infant is essential for a child's survival and growth. Maternal touch to infants changes responsively depending on the child's nurturing scenarios and changes according to the situation (Aso & Iwatate, 2011a). According to Aso

and Iwatate (2016), there were three different factor structure of touch categories in touch rating scale depend on four each nurturing scenario. Moreover, touch provides variety of functions in order to meet a child's desire, such as soothing (Korner & Thoman, 1972), safety (Tronick, 1995), holding attention (Stack & Muir, 1992), smile inducing (Dickson, Walker, & Fogel, 1994).

Breast-feeding is not only essential for an infant's survival in terms of alimentation, but is also an intimate form of communication between parents and infants. How mothers touch their children during feeding differently influences the relationship between parents and infants and child growth. For example, skin to skin contact between the mother and infant during the first days of life is said to permanently form a bond (De Chateau, 1976). Moreover, types of maternal touch that may have promoted growth or facilitated feeding are reduced in cases of failure thriving and stimulation (Polan & Ward, 1994). Breast-feeding also contributes to maternal mental stability. Mothers who breast-feeding are

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more relaxed and provide less intrusive touch compared to bottle-feeding mothers (Field, Diego, Hernandez-Reif, Figueiredo, Ezell, & Siblalingappa, 2010).

However, the number of mothers who are worried about not having enough breast milk has increased and the proportion of breast feeding has recently been decreasing (Ministry of Health, Labour and Welfare, 2006). Interaction between the parent and infant through breast-feeding is elaborative and complex (Epstein, 1993). Mothers recognize child sucking behavior such as timing of sucking and rest and simultaneously supplementing physical contact (Alberts, Kalverboer, & Hopkins, 1983). There are a large number of mothers who have child rearing stress because they feel difficulty with interacting through such physical contact and are unable to realize the pleasure of child rearing and affection to their infants through breast feeding. By examining the feeding method and touch to infants in the relationship with depression and child rearing, we can perceive the comprehensive construction process of mother–infant relationships during infancy and we believe that we can find positive support towards breast-feeding. This research focus on mothers feeding methods and examines the relationship between maternal touch to infants in a basic four nurturing scenarios, maternal depression, and child rearing stress.

Purposes of this study

There are two purposes of this study. First, we examined how touching infants would differ depending on the feeding methods, which includes breast-feeding, mixed-feeding and bottle-feeding. Secondly, we examined how maternal depression and child rearing stress would differ depending on the three feeding methods.

Methods

Participants

The participants were among 699 mothers between the ages of 16 to 44 (mean age 31.9 years) who attended their infants' four-month health check and who completed a self-reporting questionnaire (collection rate 57%). All questionnaires which we used in this study was self-reporting questionnaire. The demographic data of the survey includes, primipara 393, multipara 306; breast-feeding 369 (52.8%), mixed-feeding 205 (29.3%), bottle-feeding 125 (17.9%); male infants 327, female infants 338). The

participants reside in medium-sized City A, with a population of 200,000, in the suburbs of Tokyo.

Research period

This research was conducted from November 2008 to March 2010.

Procedures

During the infants' four-month health check at a City Hall, we explained the purposes of this research and handed the questionnaire to all those who agreed to complete and return it. The questionnaire was anonymous and was returned by mail in the stamped envelope provided. Mothers for whom individual guidance was recommended after medical examination were excluded from the research target.

Measures

A touch rating scale We used a touch rating scale that was made by Aso and Iwatate (2011a) to evaluate maternal touch. The touch rating scale is composed of 19 touch categories among 4 nurturing scenarios (playing, crying, feeding, putting infants to sleep) on a 5-point scale. Since there are biases in data distribution in the touch rating scale, we have modified it from a 5-point scale to a 3-point scale (3 for always, 2 for sometimes, 1 for never) (Aso & Iwatate, 2011b).

Child rearing stress scale and Depression We used a child rearing stress scale to evaluate maternal child rearing stress (Sato, Sugawara, Toda, Shima, & Kitamura, 1994). An item that indicates relation to baby food was eliminated since that would be inappropriate for the research target age. As a result, participants rated 21 items using the 4-point scale. In addition, we evaluated 20 items of the Zung's Japanese Self-Rating Depression Scale (SDS), Japanese version using a 4-point scale (Fukuda & Kobayashi, 1973).

Basic attributes The basic attributes of the research are mother's age, the infant's age, the sex of the infant, the birth experience of mother, and child care supporters.

Results

Calculated subscale score of each factors

In order to demonstrate the factor structure of the 19 categories of the Touch Rating Scale, categorical principle component analyses were performed for each of the four nurturing scenarios (Aso & Iwatate, 2016). We adopted the touch factors in every nurturing scenarios which founded in previous study (see Table 1). In playing scenario, there were three

Table 1 The factors extracted by categorical principal component analysis in four nurturing scenes and the categories belong to the factors

Playing scenario		Crying scenario	
Factor	Touch category	Factor	Touch category
A: Secure touch (SE)	Holding	A: Soothing touch (SO)	Picking up infant
	Picking up infant		Holding
	Changing position		Changing position
	Supporting infant's body		Quietly swaying
	Quietly swaying		Hugging
B: Affectionate touch (PA)	Hugging	B: Affectionate touch (CA)	Supporting infant's body
	Kissing		Patting
	Stroking		Rubbing
	Rubbing		Touching
	Touching		Stroking
	Holding infant's hand and feet		Shaking
	Keeping up infant's hands and feet		Keeping up infant's hands and feet
C: Playful touch (PT)	Shaking	C: Intrusive touch (CI)	Holding infant's hand and feet
	Patting		Kissing
	Tickling		Waving infant's hands and feet
	Massaging		massaging
	Waving infant's hands and feet		Poking
	Pinching	Tickling	
	Poking	Pinching	
Proportion of variance (%)			
The first axis	34		26
The second axis	9.1		12.4
Feeding scenario		Putting infants to sleep scenario	
Factor	Touch category	Factor	Touch category
A: Instrumental touch for feeding (IF)	Picking up infant	A: Instrumental touch for putting infants to sleep (IS)	Quietly swaying
	Supporting infant's body		Holding
	Changing position		Changing position
	Holding		Picking up infant
	Hugging		Supporting infant's body
	Quietly swaying		Hugging
	Keeping up infant's hands and feet		Patting
	Holding infant's hand and feet		Rubbing
	Rubbing		Holding infant's hand and feet
	Touching		Keeping up infant's hands and feet
	Stroking		Kissing
B: Jiggling (J)	Patting	B: Affectionate touch (SA)	Touching
	Poking		Stroking
	Waving infant's hands and feet		Massaging
	Massaging		Waving infant's hands and feet
C: Intrusive touch (FI)	Kissing	C: Intrusive touch (SI)	Poking
	Shaking		Shaking
	Pinching		Pinching
	Tickling		Tickling
Proportion of variance (%)			
The first axis	23.4		25.5
The second axis	12.2		12.3

factors structure. Secure touch (SE) was included five categories (e.g., holding), and all the categories were related to successive physical contact. Affectionate touch (PA) was included eight categories (e.g., hugging), and all the categories were related to positive affection.

Playful touch (PT) was six categories (e.g., patting), and all the categories were related to getting attention.

In crying scenario, there were three factors structure. Soothing touch (SO) was included eight categories (e.g., quietly swaying), and all the categories were related to calm down infants rhythmically to stop crying. Affectionate touch (CA) was included six categories (e.g., touching), and all the categories were related to show positive affection. Intrusive touch (CI) was included five categories (e.g., waving infant's hand and feet), and all the categories were negative touch to encourage infants to cry.

In feeding scenario, there were three factors structure. Instrumental touch for feeding (IF) was included twelve categories (e.g., holding), and all the categories were related to generally feeding. Jiggling (J) was included four categories, and all the categories were related to promoting sucking. Intrusive touch (FI) was included three categories (e.g., shaking), and all the categories were related to interfering with sucking.

In putting infants to sleep scenario, there were three factors structure. Instrumental touch for putting infants to sleep (IS) was included seven categories (e.g., quietly swaying), and all the categories were related to help infants to fall asleep. Affectionate touch (SA) was included six categories, and all the categories were related to show positive affection. Intrusive touch (SI) was included six categories (e.g., pinching), and all the categories were related to prevent infants from sleeping. We calculated mean of the sum of the each items as each touch factor score.

Factor analysis of child rearing stress

Factor analysis was conducted to examine the 21 items of factor structure of child rearing stress (principal factor analysis, promax solution, eigenvalue above 1). As a result, two factors that were the same as the previous study were extracted (Factor 1: mother-related child rearing stress (MS), Factor 2: child-related child rearing stress (CS) (see Table 2). Each item was divided by factor loading into on the

Table 2 Factor loadings for exploratory factor analysis with promax rotation of child-rearing stress scale

Items	I	II
I: Mother-related child rearing stress (MS)		
I tend to regret something about rearing.	.86	-.15
I think the bad side of baby to be may result.	.77	-.13
I tend to cope with the baby emotionally.	.65	.03
I don't have any idea how to take care of the baby in the future.	.58	.12
I want to throw out the baby.	.56	-.02
I don't have any idea how to contact with the baby.	.47	.20
I am sorry to bother a husband.	.45	.09
I don't have a time to spend with baby.	.44	.01
II: Child-related child rearing stress (CS)		
Falling asleep hard.	-.12	.79
Severity crying.	-.01	.74
Soothing difficult.	.08	.70
Crying at night hard.	-.08	.67
Irregular sleep time	.06	.56
The baby is not happy unless it is someone's arms.	.00	.55
Lose infant's temper.	.18	.47
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Contribution rate (%)	26.8	7.3
Cumulative contribution ratio (%)	26.8	34.1
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Factor correlation	.52	
Alpha coefficient	.82	.83

Note: Factor loadings >.40 are boldface.

basis of the above 0.4. The first factor included eight items, and the second factor included seven items. We calculated the sum of the each item as each sub-scale factor score.

Depression

We calculated the sum of the each items in depression scale as depression score (D).

Main effect of feeding methods

Depending on the feeding methods, we classified into three groups (1: Breast-feeding (BR), 2: Mixed-feeding (M), 3: Bottle-feeding (BO)). We calculated the mean and the standard deviation of each twelve touch factor score (playing: SE, PA, PT, crying: SO, CA, CI, feeding: IF, J, FI, putting infants to sleep: IS, SA, SI), MS, CS, and D by three groups. We adopted nonparametric test since we could not assume homogeneity of population. As a result, we showed in Table 3 and Table 4 the significant items that are above significant level 0.05. The significant level of multiple comparison was above 0.01 by modification of Bonferroni's inequality. Kruskal- Wallis test was

Table 3 The main effects of feeding methods in touch factors

Touch factor	Breast-feeding (BR) (n=369)		Mixed-feeding (M) (n=205)		Bottle-feeding (BO) (n=125)		Main effect	Multiple comparison test
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>p</i>	
Playing scenario								
FI Secure touch (SE)	13.42	1.97	13.29	1.94	13.44	1.82	<i>n.s</i>	
FII Affectionate touch (PA)	20.72	2.51	20.37	2.43	20.64	2.53	<i>n.s</i>	
FIII Playful touch (PT)	13.18	2.57	12.54	2.50	12.85	2.87	*	**BR>M
Crying scenario								
FI Soothing touch (SO)	21.41	2.32	21.31	2.23	21.16	2.51	<i>n.s</i>	
FII Affectionate touch (CA)	12.86	2.70	12.72	2.62	13.14	2.85	<i>n.s</i>	
FIII Intrusive touch (CI)	7.27	2.29	6.82	1.94	7.62	2.43	**	**BO>M
Feeding scenario								
FI Instrumental touch for feeding (IF)	24.50	4.88	24.04	4.61	21.86	4.88	***	***BR>BO, ***M>BO
FII Jiggling(I)	4.93	1.18	4.83	1.13	4.95	1.45	<i>n.s</i>	
FIII Intrusive touch (FI)	3.09	0.35	3.07	0.34	3.20	0.84	<i>n.s</i>	
Putting infants to sleep scenario								
FI Instrumental touch for putting infants to sleep (IS)	15.48	3.44	15.58	3.17	15.84	3.65	<i>n.s</i>	
FII Affectionate touch (SA)	13.08	3.15	13.26	3.06	13.48	3.35	<i>n.s</i>	
FIII Intrusive touch (SI)	6.82	1.20	6.70	1.24	7.10	1.47	**	***BO>M

* $p<.05$, ** $p<.01$, *** $p<.001$

Table 4 The main effect of feeding methods in child rearing stress and depression

Measure	Breast-feeding (BR)		Mixed-feeding (M)		Bottle-feeding (BO)		Main effect	Multiple comparison test
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>p</i>	
Depression (D)	40.19	7.64	40.06	6.82	40.53	7.69	<i>n.s</i>	
Child rearing stress								
Mother-related child rearing stress (MS)	11.18	3.33	11.47	3.57	11.02	3.14	<i>n.s</i>	
Child-related child rearing stress (CS)	11.80	3.91	11.81	3.67	10.57	3.38	**	**BO>BR, **BO>M

* $p<.05$, ** $p<.01$, *** $p<.001$

conducted with the twelve touch factors, MS, CS and D as dependent variables and the feeding methods as independent variables to determine the main effect of the feeding method. We adopted Mann-Whitney U test as multiple comparison test. As a result, there were significant main effect of feeding methods in PT in playing scenario, CI in crying scenario, IF in feeding scenario, and SI in putting infant to sleep scenario. As the results of the multiple comparison test, BR more frequently used the PT in playing scenario than M. BO more frequently used the CI in crying scenario than M. BR and M more frequently used the IF in feeding than BO. BO more frequently used the SI in putting infant to sleep scenario than M.

In addition, a significant main effect of feeding methods was found for CS. As the result of the multiple comparison test, CS in BO was significantly higher than those of BR and M.

Discussion

Feeding method and maternal touch

This study founded that mothers in the BR group more frequently used playful touch during play than those in the M group. BR and M use instrumental touch for feeding more often than BO mothers. The results seen here are consistent with Bernal and Richards (1970), who found that breastfeeding mothers tend to touch their infants more during both feeding and at bedtime. However, in the pres-

ent study BO mothers were observed to use intrusive touch when infants were crying and when putting infants to sleep more frequently than did M mothers. It has been reported that breastfeeding mothers use little intrusive behavior during feeding (Field et al., 2010).

This study is the first to find that although the use of intrusive touch during feeding does not differ among the three feeding method groups, it does differ among the groups for crying and putting infants to sleep. Intrusive touch as defined in our previous study negative touch that does not address the infant's needs for that particular situation (Aso & Iwatate, 2011b). In the present study, BO mothers used such negative touch inappropriate for the child's need during crying and putting infants to sleep, when the child needed to be calmed. Soothing touch during crying and instrumental touch when putting infants to sleep did not differ among the three groups, indicating that BO mothers can act to soothe infants and put them to sleep as well as other mothers can. One possible reason that BO mothers use intrusive touch more frequently in crying and putting infants to sleep is that, while sucking the mother's nipple is the most effective and calming physical contact for infants, it is not possible among BO mothers for infants to do so. We also speculate that BO mothers unconsciously tend toward using intrusive touch in scenarios requiring their patience, as they feel difficulty with soothing and calming down. However, we would like to consider this result cautiously in further research, including not bottle-feeding factor but another factors that influence on intrusive touch in crying and putting infants to sleep.

Feeding method, depression, and childrearing stress

The BO group had higher childrearing-related stress than the other two groups. According to Mezzacappa and Katkin (2002), the act of breastfeeding decreases mothers' negative affect after feeding, whereas bottle-feeding decreases mothers' positive affect. Additionally, breastfeeding mothers spend more time stroking their infant, which enhances the mother's sensitivity toward her child (Field et al., 2010).

It is reasonable to think that bottle-feeding mothers stroke infants less frequently than breastfeeding mothers during feeding due to the physical limitation of having to hold the bottle. Polan and Ward (1994) state that the way mothers touch their infant

may facilitate feeding. Stroking infants while feeding will construct a positive attachment between mother and child because it increases the sensitivity of the mother toward the child and facilitates feeding. A bottle-feeding mother may not be able to develop sensitivity as a parent due to this comparatively lower experience of stroking infants during feeding. As a result, being unable to deal with the child's signals or needs responsively, a bottle-feeding mother may tend to feel stress over childrearing and may have difficulty establishing a positive mutual interaction between herself and her child.

Limitations and future study

This research suggests the possibility that breastfeeding decreases the stress of childrearing and lowers mothers' negative touch of infants while increasing positive touch. It is also clear that breast-feeding is a very important communication tool for establishing the mother-infant relationship during early infancy. To establish breastfeeding method and practice, support for enhancing mothers' sensitivity for understanding the child's needs or signals accurately is needed. For that reason, how physical contact affects the mutual interaction of mother and child should be focused on. Specifically, there is a need for programs that enhance mothers' sensitivity and encourage mothers not just to understand the variety of physical contact, but also to use different touches actively in response to the child's needs.

This study did not examine factors related to maternal breast-feeding, such as socioeconomic background, family support, and individual characteristics. In the future, we should examine the mechanism of how to construct a positive interaction between mother and infant during feeding. In particular, we should focus on the relationship between maternal touch and infants' signals and needs, and on maternal sensitivity. Lastly, we need to clarify the comprehensive process by which maternal touch of infants, mental health, and social support influence the mother-infant interaction.

An additional note

This study is a reanalysis of Aso and Iwatate's data (The Journal of Child Health, 2016) from another viewpoint.

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Note

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