



Effects of Oketani Breast Massage on Breast Pain, the Breast Milk pH of Mothers, and the Sucking Speed of Neonates

Cho, Jeongsug¹ · Ahn, Hye Young² · Ahn, Sukhee¹ · Lee, Myeong Soo³ · Hur, Myung-Haeng²

¹College of Nursing, Chungnam National University, Daejeon

²College of Nursing, Eulji University, Daejeon

³Medical Research Division, Korea Institute of Oriental Medicine, Daejeon, Korea

Purpose: This study was done to test the effects of Oketani breast massage on breast pain and breast milk pH of mothers, and sucking speed of neonates. **Methods:** A nonequivalent control group and a pretest-posttest design was used. Postpartum mothers complaining of breast pain were recruited at a postpartum care center. The application of Oketani breast massage by an Oketani massage therapist was the experimental treatment. The control group received the conventional massage technique from a nurse at the postpartum care centre. The collected data were analysed using a χ^2 -test and a t-test with the SPSS WIN 12.0 program. **Results:** The participants were homogeneous in age, gestation period, and birth weight. Breast pain ($t=8.384, p < .001$) was significantly relieved, and breast milk pH ($t=4.793, p < .001$) was significantly increased in the experimental group compared to the control group. The sucking speed of the neonates in the experimental group was significantly increased compared to the control group ($t=9.920, p < .001$). **Conclusion:** These findings indicate that Oketani breast massage is effective in relieving breast pain and increasing breast milk pH as well as the sucking speed of neonates.

Key Words: Breast, Massage, Pain, Hydrogen-ion concentration

INTRODUCTION

Although it is already well known that breast milk is the most ideal source of nutrition for the health of babies' bodies and minds, many mothers discontinue breastfeeding. Recently in Korea, there has been interested in and campaigns encouraging breastfeeding, but according to statistical data that consider breastfeeding to be exclusive breastfeeding only as well as combining breast milk and baby food, the breastfeeding rate in Korea was 59% in 1985, 11.4% in 1994, 14.1% in 1997, 10.2% in 2000, 16.5% in 2003, and 24.2% in 2006 (Korea Institute for Human and Social Affairs [KIHASA], 2008). These rates are very low compared to the figures reported by the United States National Center for Health Statistics (McDowell, Wang, & Kennedy-Stephenson, 2008),

which were 60% in 1994, 64% in 1998, 67% in 2000, 70% in 2004, and 77% in 2006.

Recently, many non-governmental organizations, UNICEF, and the Korean Nurses Association have shown great interest in breastfeeding, campaigning actively to promote it; however, the rate of breastfeeding, including combined feeding, has remained low, at 24.2% (KIHASA, 2008). The results from a study showed a large drop in the breastfeeding rate, from 61.7% at 1 month to 26.0% at 2 months (Yeo & Hong, 2003). Studies on the current state of breastfeeding and breastfeeding discontinuation have revealed that lactation disturbances during the initial phase were caused by physical fatigue, the lack of breast milk, problems in managing the nipple and breast, and babies' breastfeeding difficulties (Eum, Sohn, & Kim,

주요어: 유방, 마사지, 동통, 수소이온지수

Corresponding author: Hur, Myung-Haeng

College of Nursing, Eulji University, 143-5 Yongdu-dong, Jung-gu, Daejeon 301-746, Korea.
Tel: +82-42-259-1714, Fax: +82-42-259-1709, E-mail: mhhur@eulji.ac.kr

- This article is based on a part of the first author's master's thesis from Eulji University.

투고일: 2012년 3월 31일 / **수정일:** 2012년 6월 13일 / **게재확정일:** 2012년 6월 18일

2007). The difficulties faced by subjects who practiced breastfeeding 1 week after delivery were the lack of breast milk, nipple fissures, inverted nipples, and so on (Yoo, Kim, & Seo, 2002), leading to the conclusion that the amount of breast milk and the management of the nipple and breast continue to be problems.

In Korea, various educations for breastfeeding are provided as nursing interventions for the purpose of promoting breastfeeding. For the purpose of increasing the low breastfeeding rate, the factors affecting breastfeeding and the effects of nursing interventions have been previously examined. Among the measures that have been implemented to promote breastfeeding, improving knowledge (Sung & Kim, 2003), boosting confidence (Suh & Lee, 1998), conducting breastfeeding education and follow-up care (Park & Koh, 2001), conducting breastfeeding management programs (Choi & Kim, 2007), following up via telephone, and practicing rooming-in (Wang & Kim, 2009) have been effective in increasing the rate of breastfeeding continuation when implemented. However, there was no significant difference 2 weeks after delivery between the breastfeeding rates of the experimental group, supplemented with a breastfeeding management program or telephone follow-up, and the control group, whereas there was a significant difference 4 weeks after delivery (Choi & Kim, 2007). From these results, one can infer that other measures for managing breastfeeding, in addition to education and management, are needed 2 weeks after delivery (Choi & Kim, 2007). Lee also emphasized the necessity of breast nursing care that is focused on the lactation phase and of effective and proactive nursing interventions, along with in-depth education (Lee, 1999). In particular, after systematically examining the effects of various measures for treating blood congestion during breastfeeding, it was concluded that there was not sufficient scientific evidence that ultrasonic waves and cabbage leaves alleviated blood congestion in the breast (Mangesi & Dowswell, 2010).

As another intervention method, Oketani breast massage developed by Oketani, is painless and separates the retromammary space, which is the connective tissue between the breast and the greater pectoral muscle (Oketani, 1991a). Oketani breast massage is also known to promote the secretion of milk, to alleviate an inverted nipple or papilla plana, and to relieve blood congestion in the breast as well as breast pain. Additionally, it is

very effective in increasing breast milk pH (potential of hydrogen), in increasing sweet taste of breast milk and in stimulating the growth and development of the infant (Oketani, 1991a).

The pH of cow's milk or breast milk can differ depending on the type of milk. In general, the pH of fresh milk is mildly acidic, and the pH of fresh human milk is mildly alkaline. The pH of the colostrum started high at 7.45, dropped to 7.04 after 2 weeks of breastfeeding, stayed between 7.0 and 7.1 over the next three months, and became high again at 7.4; this finding was thought to be due to changes in the composition of breast milk (Morris et al., 1986). However, Harrison and Peat (1972) reported that the breast milk pH was 7.29, on average, ranging between 6.80 and 7.70. Nonetheless, breast milk pH lacks scientific data and has not been sufficiently studied. Although there have been no studies confirming the effects of breast massage on breast milk pH, Oketani has stated that, when there is a disturbance of blood and lymph circulation within the breast, the quality of breast milk deteriorates, producing oxidised milk that does not taste sweet at all but rather tastes sour or salty and is highly viscous and hazy (Oketani, 1991a). However, when blood circulation is improved, better quality milk with a higher pH is produced, which aids in the growth and development of the infant (Oketani, 1991b). But previous studies didn't give sufficient evidence the effects of Oketani's massage on breast pain reduction. Moreover, it is rare to find the effects of Oketani's massage on breast milk pH or sucking speed of neonates. There was no scientific evidence that substantiated that Oketani breast massage had an impact on breast milk pH, and the only finding reported was that the concentration and the total energy of lipids and casein were affected (Foda, Kawashima, Nakamura, Kobayashi, & Oku, 2004). It was also reported that Oketani breast massage reduced the pressure within the breast by eliminating blood congestion and increased breast milk pH, resulting in better tasting breast milk and the tendency of babies to attempt to suck better.

In summary, Oketani breast massage has been suggested to alleviate breast pain and increase breast milk pH, improving the taste of breast milk and producing faster sucking speed and the enhanced growth and development of infants; however, scientific evidence corroborating the effects of breastfeeding using Oketani

breast massage is insufficient.

Thus, this study attempted to elucidate the effects of Oketani breast massage on breastfeeding compared with conventional massage. In other words, it attempted to assess pain due to blood congestion in the breast as it impacts the mother by comparing pain before and after treatment. It also attempted to verify the effects of Oketani breast massage by investigating the quality of breast milk via breast milk pH and the sucking speed of neonates.

The purpose of this study was to test the effects of Oketani breast massage on breast pain, breast milk pH, and the sucking speed of neonates in the experimental group that received Oketani breast massage and in the control group that received conventional massage.

METHODS

A. Study design

The design of this study was quasi-experimental study, using a nonequivalent control group and a pretest-posttest design to understand the effects of Oketani breast massage on breast pain, breast milk pH, and sucking speed.

B. Subjects

Mothers who were hospitalised at a postpartum care centre in D city and who indicated that they wanted to breastfeed were included in this study. The including criteria were postpartum mothers who were nursing their infants, complaining the breast engorgement pain, and agreeing to participate in this study. The subjects were randomly selected from the mothers who met the following criteria: Mothers who understood the purpose, procedure, benefits, disadvantage of this study and who agreed to participate. To maintain same environment and to prevent the expansion and contamination of the experiment, the subjects were selected at the postpartum care centre at different times.

The specific criteria for selecting study subjects included mothers who were between 20 and 40 years of age, who gave birth through vaginal delivery, caesarean section, or induced labour with a gestational period of between 37 and 42 weeks, and who had a neonate who weighed more than 2,500 g at birth without congenital

anomaly. The exclusion criterion was mothers who had pregnancy, labour and delivery, and postpartum complications.

The sample size was computed using the G power 3.1 program. The sample size was calculated upon t-test to compare the means of two independent samples, with 26 individuals in each group; the effect size was $d=0.8$, the level of significance was $\alpha = .05$, and the power of the test was 0.80. Each group consisted of 30 individuals, which was large considering the dropout rate. From the study subjects, 13 mothers (8 in experimental and 5 in control group) withdrew from participation in the study or gave up on breastfeeding; During the study, 8 mothers in the experimental group dropped out from the study, because the breast milk was rancid. Five mothers in the control group dropped out due to interruption of breast milk feeding and refusal to take a breast milk sample. Thus, a total of 47 individuals, including 22 mothers in the experimental group and 25 mothers in the control group, were finalized as the study subjects.

C. Experimental Treatment: Breast massage program

The experimental treatment in this study was Oketani breast massage, which was devised by Sotomi Oketani of Japan, that was performed by a researcher who was certified as an Oketani lactation management expert. Oketani breast massage refers to the type of massage in which a total of 8 hand techniques, including 7 retro-mammary space-separating techniques and 1 milking technique for each area on the left and right breasts, are performed on the left and right breasts for 30 minutes (Figure 1). Control group received the conventional massage by nurse in the postpartum care center and then, fed the breast milk to the baby during total 30 minutes.

D. Measures

a. Breast pain

Breast pain is that postpartum mother is feeling any pain of the breast after childbirth due to breast engorgement or nipple cracking (Oketani, 1991a). A visual analogue scale was used to measure breast pain. The visual analogue scale for measuring breast pain yields a value obtained by measuring, to one decimal place in centimetres, the distance to a point after marking the

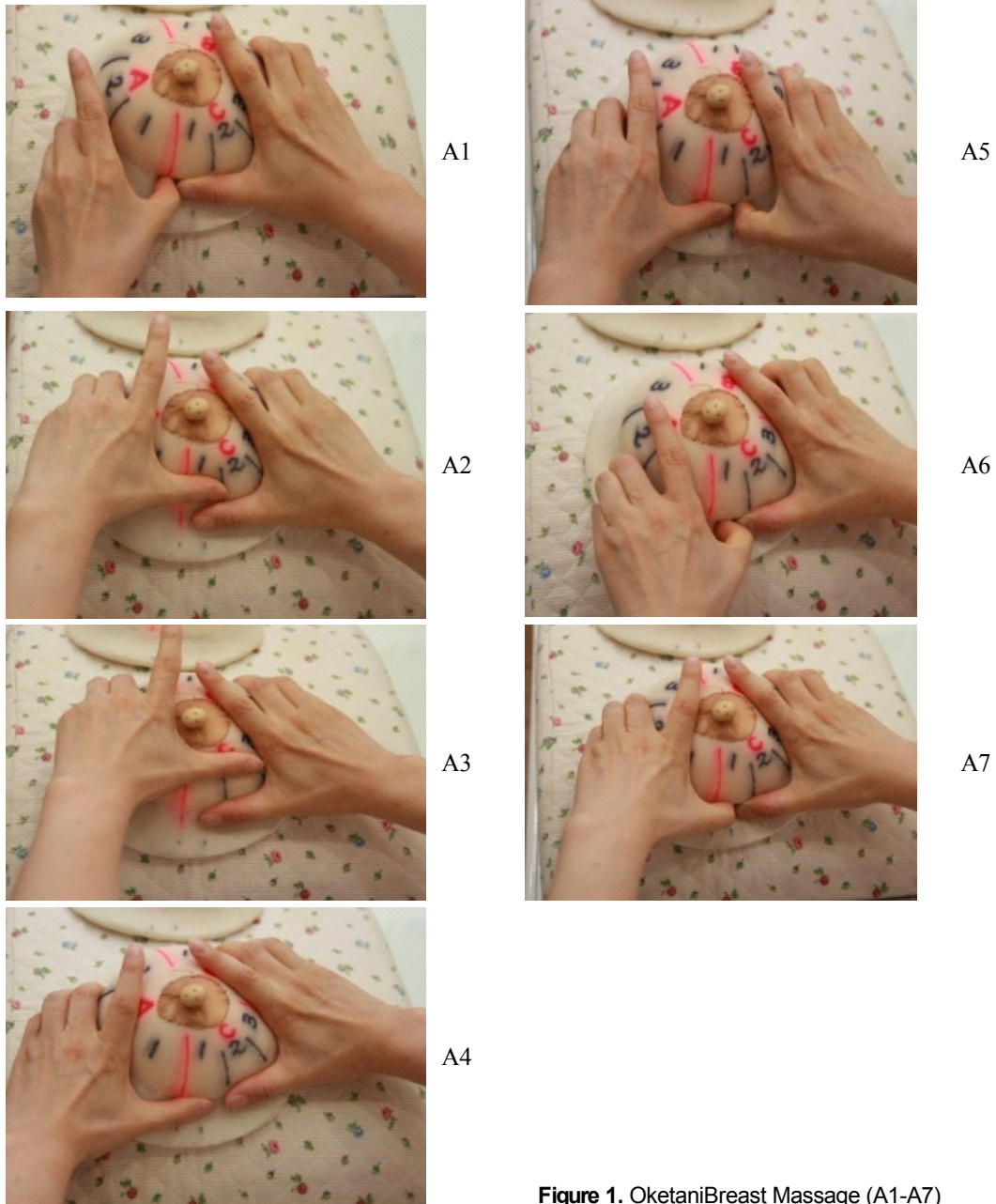


Figure 1. OketaniBreast Massage (A1-A7)

scale for the severity of breast pain felt by the subject on a 10 cm-long horizontal line. This scale ranged from ‘no symptoms’ to ‘very severe symptoms’ of breast pain. The greater the breast pain score is, the more severe the breast pain is.

b. Breast milk pH

The pH (Potential Hydrogen) of breast milk is to measure the acidity or alkalinity by measuring the concentration of hydrogen-ion in the breast milk. The

pH of more than 7.0 means the alkalinity and the pH of less than 7.0 means the acidity. The pH of 7.0 means neutrality (Miller & Keane, 1987). To determine the breast milk pH, breast milk was collected in a serum test tube, refrigerated, and transported to the laboratory in an icebox within 24 to 48 hours. Once at the laboratory, the breast milk was removed, and its pH was measured with a pH meter (Mettler-Toledo AG, CH-8603, Schwerzenbach, Switzerland). The temperature of the breast milk at the time of examination was between 7 and 13°C.

c. *Sucking speed of neonates*

Sucking speed refers to the number of times a neonate sucks during 1 minute, and in this study, it refers to the mean of the twice measurements of the number of sucks per minute taken by a nurse at the postpartum care centre within 5 minutes of beginning breastfeeding.

E. Data collection process

The details of the data collection process were as follows.

- Those subjects at the postpartum care centre who met the selection criteria were convenience sampled, with priority given to the data collection of the control group. As the pretest of the control group, data on demographic, childbirth, and neonates-related characteristics, and breast pain were collected by a nurse at the postpartum care centre using a survey. Sucking speed was also measured twice, at an interval of 1 minute, by a nurse at the postpartum care centre within 5 minutes of beginning breastfeeding. For the measurement of breast milk pH before breastfeeding, breast milk was collected in a serum test tube before breastfeeding and was stored in a refrigerator until examination. The breast milk stored in the refrigerator was transported to the laboratory in an icebox, and its pH was measured.
- After conventional breast massage and breast feeding was executed for the control group for 30 minutes, breast pain, sucking speed, and breast milk pH were measured with same procedure as posttest
- After data collection for the control group was completed, the subjects at the same postpartum care centre who met the selection criteria were set as the experimental group, and data on the demographic, childbirth, and neonates-related characteristics, breast pain, sucking speed, and breast milk pH were measured for the pretest.
- After the experimental group received Oketani breast massage for 30 minutes as the experimental treatment, breast pain, sucking speed, and breast milk pH

were measured with same procedures as pretest.

F. Ethical Considerations

The subjects agreed to participate in this study. The purpose, procedure, benefits, disadvantage involved in this study were explained to the subjects. After data collection, 3-session Oketani's massage was given to mothers in the control group for free.

G. Data analysis

SPSS for Windows, version 12.0, was used for the data analysis. The subjects' demographics, childbirth, and neonates-related characteristics were analysed using frequency, percentages and means, and the homogeneity of the two groups was determined with a χ^2 -test and a t-test. To test the effects of the experimental treatment on breast pain, breast milk pH, and sucking speed, t-test was used after calculating changed scores (post-pre test scores).

RESULTS

A. Homogeneity test of subjects' characteristics

The mean age of the experimental group was 29.9 years old, and the mean age of the control group was 31.4 years old. The pre-pregnancy body weight was 51.9 kg for the experimental group and 53.7 kg for the control group. The gestation period was 299.9 days for the experimental group and 294.5 days for the control group. From the homogeneity test between groups, there were no significant differences in the demographics and childbirth-related characteristics regarding maternal age, employment status, pre-pregnancy body weight, gestation period, type of delivery, birth order of the neonate, breast management experience before delivery, and breastfeeding education experience (Table 1). With regard to neonatal characteristics, the mean height and weight of the neonates at the time of birth were 51.8 cm and 3.32 kg for the experimental group and 52.3 cm and 3.40 kg for the control group, respectively; the neonatal age at the time of the data collection was 12.0 days for the experimental group and 9.8 days for the control group, with no significant differ-

ences between the two groups (Table 1).

($t=8.384, p<.001$).

B. Effects of Oketani breast massage on breast pain

The effects of Oketani breast massage on breast pain was shown in Table 2. Breast pain before the experimental treatment was 7.10 for the experimental group and 7.16 for the control group, with no significant difference between the two groups. However, after the experimental treatment, breast pain was 1.95 for the experimental group and 6.24 for the control group, with a significant difference between the two groups ($t=9.119, p<.001$). Breast pain after the experimental treatment decreased by 5.14 points in the experimental group and by 0.92 points in the control group compared to the breast pain experienced by the subjects before the treatment, indicating that the pain of the experimental group decreased significantly compared to the control group

C. Effects of Oketani breast massage on breast milk pH

Breast milk pH before the experimental treatment was 7.16 for the experimental group and 7.10 for the control group, with no significant difference between the two groups; however, after the experimental treatment, breast milk pH was 7.41 for the experimental group and 7.13 for the control group, with a significant difference between the two groups ($t=4.015, p<.001$). Breast milk pH after the experimental treatment increased by 0.25 in the experimental group and by 0.03 in the control group compared to the breast milk pH before the treatment, indicating that the milk pH of the experimental group increased significantly compared to the control group ($t=4.793, p<.001$)(Table 2).

Table 1. Homogeneity Test of Characteristics between the Experimental and the Control Group (N=47)

Characteristics	Categories	Exp. (n=22)	Cont. (n=25)	χ^2 or t	p
		n (%) or M±SD	n (%) or M±SD		
Job	Yes	14 (63.6)	16 (64.0)	0.001	.979
	No	8 (36.4)	9 (36.0)		
Delivery type	Vaginal birth	15 (68.2)	15 (60.0)	0.339	.560
	Caesarean birth	7 (31.8)	10 (40.0)		
Birth order	First	14 (63.6)	14 (56.0)	0.283	.595
	Second	8 (36.4)	11 (44.0)		
Breast management experience	Yes	9 (40.9)	11 (44.0)	0.046	.831
	No	13 (59.1)	14 (56.0)		
Breast feeding education experience	Yes	14 (63.6)	16 (64.0)	0.001	.979
	No	8 (36.4)	9 (36.0)		
Maternal age (year)		29.9±3.26	31.4±4.10	1.408	.166
Pre-pregnancy body weight (kg)		51.9±6.24	53.7±7.70	0.910	.368
Postpartum body weight (kg)		60.9±7.62	60.5±7.34	0.175	.862
Gestation period (days)		299.9±17.25	294.5±19.79	0.984	.330
Birth height of neonate (cm)		51.8±2.55	52.3±2.42	0.648	.521
Birth weight of neonate (kg)		3.3±0.39	3.4±0.48	0.643	.523
Neonatal age (days)		12.0±8.48	9.8±5.99	1.006	.320
Breast pain (baseline)		7.1±1.92	7.2±1.58	0.126	.901
Breast milk pH (baseline)		7.2±0.21	7.1±0.24	0.768	.447
Breast milk sucking speed (times/minute) (baseline)		35.1±14.99	28.1±14.93	1.487	.145

Exp.=experimental group; Cont.=control group.

D. Effects of Oketani breast massage on the sucking speed of the neonates

The sucking speed of the neonates before the experimental treatment was 35 times/minute for the experimental group and 28 times/minute for the control group, with no significant difference between the two groups; however, after the experimental treatment, the sucking speed of the neonates was 53 times/minute in the experimental group and 29 times/minute in the control group, with a significant difference between the two groups ($t=4.987, p<.001$). The difference in the sucking speed of the neonates before and after the experimental treatment was an increase of 18 times/minute in the experimental group but only by 1 time/minute in the control group, indicating that the sucking speed of the experimental group increased significantly compared to the control group ($t=9.920, p<.001$)(Table 2).

DISCUSSION

This study attempted to test the effects that Oketani breast massage has on breastfeeding as a method for relieving breast pain. While the control group received conventional breast massage, the experimental group received Oketani breast massage, and the resulting effects on breast pain, breast milk pH, and the sucking speed of neonates were comparatively analysed.

Postpartum breast pain is a problem that occurs frequently in mothers, but health care providers are not very proactive in its management. Thus, it has been reported that many mothers discontinue breastfeeding because of a lack of breast milk (Lee, 2001) or problems

of the breast (Park, 2001). Mothers relieve breast pain using the popular methods of hot pack and breast massage, but many mothers continue to suffer from severe pain.

The study results showed that breast pain was significantly relieved in the experimental group that received Oketani breast massage compared to the control group. After the experimental treatment, breast pain was reduced by 5.14 in the experimental group and by 0.92 in the control group, indicating that breast pain was very significantly relieved in the experimental group. This small amount of breast pain relief in the control group appears to be a natural result of the decrease in the amount of breast milk following breastfeeding. However, because the breast pain relief in the experimental group was very significant compared with the control group, it can be concluded that Oketani breast massage is very effective in alleviating breast pain. This result is similar to studies that have reported that Oketani breast massage relieved breast pain during the initial phase of puerperium (Konish, Yoshidome, Miyazaki, & Kumashiro, 2004). These results also support a study that claimed that Oketani breast massage was a painless breast-massaging method that softens the entire breast (Foda et al., 2004).

The breast milk pH increased by 0.25 in the experimental group and by 0.03 in the control group after the experimental treatment, indicating that breast milk pH in the experimental group increased significantly. In the past, studies on breast milk pH were insufficient and were mostly conducted by measuring pH, and more studies existed on the pH of cow's milk than that of breast milk. The results of one study measuring breast

Table 2. Effects of Oketani Massage on Breast Milk pH, and Breast Milk Sucking Speed (N=47)

Variables	Groups	Pretest	Posttest	Change(post-pre)
		M±SD	M±SD	M±SD
Breast pain	Exp. (n=22)	7.10±1.92	1.95±1.29	-5.14±2.06
	Cont. (n=25)	7.16±1.58	6.24±1.80	-0.92±1.33
	t (p)	0.126 (.901)	9.119 (<.001)	8.384 (<.001)
Milk pH	Exp. (n=22)	7.16±0.21	7.41±0.25	0.25±0.20
	Cont. (n=25)	7.10±0.24	7.13±0.21	0.03±0.09
	t (p)	0.768 (.447)	4.015 (<.001)	4.793 (<.001)
Breast milk sucking speed (times/minute)	Exp. (n=22)	35.1±14.99	53.2±14.55	18.1±6.78
	Cont. (n=25)	28.1±14.93	29.4±15.40	1.3±2.55
	t (p)	1.487 (.145)	4.987 (<.001)	9.920 (<.001)

Exp.=experimental group; Cont.=control group.

milk pH (Harrison & Peat, 1972) found that when breast milk was collected before breastfeeding 1 week after delivery, the breast milk pH ranged from 6.80 to 7.70, and the mean was 7.29. The results of another study found that the pH of colostrum was high, at 7.45, but the pH was 7.04 during the second week of breastfeeding (Morris et al., 1986). Considering the results of those previous studies, the results of this study can be considered average because the breast milk pH values for the experimental group and the control group were 7.16 and 7.10, respectively, before the experimental treatment. However, in our study, after the experimental treatment, the breast milk pH of the experimental group was 7.41, which was similar to the pH of colostrum or that of breast milk after two weeks. However, although the difference in breast milk pH between the experimental group and the control group was statistically significant, there was a limitation in explaining the difference in the taste of the milk with different pH values. Oketani (1991a) stated that the taste of milk was determined by changes in the quality of the milk within the breast, i.e., milk with a pH of greater than 7 was of a higher quality. In our study, the pH was greater than 7.0 for both the experimental group and the control group before and after the experimental treatment, which means that both groups were at the normal level based on Oketani's standards provided above. While conducting this study, milk tasting as an organic indicator was attempted, with the goal of examining differences in the milk, but no scientific conclusion could be reached. Moreover, as this study did not analyse the composition of the milk, it is necessary to study the differences in milk composition in the future. In addition, because no recent study was found to corroborate the study by Harrison and Peat (Harrison & Peat, 1972), which stated that the pH of milk is important for growth and development, there is also a need for a follow-up study on this issue in the future. The results of this study are similar to those of Kobayasi (1991) who reported that with powdered formula, the pH did not differ from the beginning to the end of bottle feeding, while in cases in which a mother breastfed a neonate, breast milk pH increased from 7.2 at the beginning to 7.4 at the end of breastfeeding, resulting in the breast milk becoming alkalised and tasting better.

Furthermore, the sucking speed of neonates increased by 18 times/minute in the experimental group and by

only 1 time/minute in the control group after the experimental treatment, indicating that the increase was more significant in the experimental group than in the control group. Park (2004) reported that instances of clumsy suckling, e.g., when the neonate's suckling power was weak, when the neonate did not feed eagerly, and when the neonate fed too eagerly, caused many mothers to give up breastfeeding. From this finding, one can infer that the condition of the breast and the baby's suckling are very closely related. This relationship supports the principle that the neonate's degree of suckling, i.e., suckling power and rhythm, and the suckling conditions are enhanced when Oketani breast massage is used to induce an increase in the amount of breast milk as well as to improve the stretching of the areola and the condition of the breast (Oketani, 1991a, 1991b). According to a study that evaluated breastfeeding rate depending on the extensibility of the nipple and areola (Joo, 2008), the favourable group with extensible nipple and areola, displayed higher breastfeeding rates after childbirth compared to the other group. Thus, it appears that improvements in the extensibility of the nipple and areola, fostered by breast massage, affect the suckling process of neonates positively, resulting in a higher suckling speed.

CONCLUSION

Oketani breast massage was very effective in alleviating breast pain and increasing breast milk pH and the sucking speed of neonates. Oketani breast massage could be utilized as an independent nursing intervention method.

We suggest that the repeated experimental study is needed to find the evidence of Oketani breast massage on the growth and development of babies and on a higher continuance rate of breastfeeding in the future.

REFERENCES

- Choi, Y. J., & Kim, M. O. (2007). Effect of a breastfeeding management program on breastfeeding duration. *Korean Journal of Women Health Nursing, 13*, 245-253.
- Eum, G., Sohn, H., & Kim, H. (2007). Breast feeding rate and related factors in Busan. *Journal of Korean Society of Maternal Child Health, 11*, 78-85.
- Foda, M. I., Kawashima, T., Nakamura, S., Kobayashi, M., &

- Oku, T. (2004). Composition of milk obtained from un-massaged versus massaged breasts of lactating mothers. *Journal of Pediatric Gastroenterology Nutrition*, *38*, 484-487.
- Harrison, V. C., & Peat, G. (1972). Significance of milk pH in newborn Infants. *British Medical Journal*, *4*, 515-518.
- Joo, J. O. (2008). *Impact of nipple and areola extensibility and ease of milk extraction during early postpartum period on nipple pain and continuation of breast-feeding*. Unpublished master's thesis, Yonsei University, Seoul.
- Kobayashi, N. (1991). *Breast milk is a baby's full course meal-part 1*. Retrieved February 8, 2012, from <http://www.childresearch.net/SCIENCE/KOBY/FUTURE/cbse0007.html>
- Konish, K., Yoshidome, A., Miyazaki, F., & Kumashiro, M. (2004). The effect of oketani style breast massage on the autonomic nervous function in the early puerperal stage. *Journal of Japan Academy of Midwife*, *18*, 87-93.
- Korea Institute for Human and Social Affairs. (2008). *A survey on the fertility and familial health: Welfare of Korean in 2006*. Seoul: Author.
- Lee, H. S. (2001). *Performance of breastfeeding by employed mother*. Unpublished master's thesis, Kosin University, Busan.
- Lee, H. W. (1999). *The effect of breast nursing care of each milk physiology stage on the breast feeding practice*. Unpublished master's thesis, Yonsei University, Seoul.
- Mangesi, L., & Dowswell, T. (2010). Treatments for breast engorgement during lactation. *Cochrane Database Systematic Reviews*, *8*(9), CD006946. <http://dx.doi.org/10.1002/14651858.CD006946.pub2>.
- McDowell, M. M., Wang, C., & Kennedy-Stephenson, J. (2008). Breastfeeding in the United States: Finding from national health and nutrition examination surveys, 1999-2006. *National Center for Health Statistics Data Brief*, *5*, 1-8.
- Miller, B. F., & Keane, C. B. (1987). *Encyclopedia and dictionary of medicine, nursing, and allied health*. Philadelphia: W. B. Saunders.
- Morriss, F. H., Brewer, E. D., Spedale, S. B., Riddle, L., Temple, D. M., Caprioli, R. M., et al. (1986). Relationship of human milk pH during course of lactation to concentrations of citrate and fatty acids. *Pediatrics*, *78*, 458-464.
- Oketani, S. (1991a). *Oketani's breast massage therapy*. Tokyo, Japan: Bong Hwang Dang Press.
- Oketani, S. (1991b). *The practices of oketani's breast massage therapy*. Tokyo, Japan: Bong Hwang Dang Press.
- Park, B. I. (2001). *The survey on the knowledge to breast-feeding of married nurses with Infant-toddler and actual state*. Unpublished master's thesis, Soon Chun Hyang University, Cheonan.
- Park, S. H., & Koh, H. J. (2001). Effect of breast-feeding education and follow-up care on the breast-feeding rate and the breast-feeding method-focused on home visit and phone counseling. *Korean Journal of Women Health Nursing*, *7*, 30-43.
- Park, S. O. (2004). *Effects of a breastfeeding support on the breastfeeding knowledge, attitude, level of Na⁺ within breast milk and continuing breastfeeding*. Unpublished doctoral dissertation, Pusan National University, Busan.
- Suh, Y., & Lee, E. (1998). The effect of breast feeding promotion program on the changes in confidence towards the breast feeding practice. *Journal of the Korean Society of Maternal and Child Health*, *2*, 13-27.
- Sung, M. H., & Kim, D. H. (2003). Effects of breast-feeding education and continuous phone counseling on the promotion of breast-feeding compliance. *Journal of the Korean Society of Maternal and Child health*, *7*, 167-178.
- Wang, H. J., & Kim, I. O. (2009). Effect of rooming-in of new mothers on breast feeding rate. *Korean Journal of Women Health Nursing*, *15*, 5-12. <http://dx.doi.org/10.4069/kjwhn.2009.15.1.5>
- Yeo, J. H., & Hong, S. C. (2003). The study on the knowledge, attitude and practice rate of breast feeding. *Journal of the Korean Society of Maternal and Child Health*, *7*, 155-165.
- Yoo, E. K., Kim, M. H., & Seo, W. S. (2002). A study on the rate of breast-feeding practice by education and continuous telephone follow-up. *Korean Journal of Women Health Nursing*, *8*, 424-434.

Summary Statement

■ What is already known about this topic?

In Japan, Oketani breast massage is well known as a kind of postpartum breast care method to promote the secretion of milk, to alleviate inverted nipples or papilla plana, and to relieve breast congestion and/or pain. Also, it is very effective in increasing breast milk pH, and the sweet taste of breast milk. But there is no sufficient evidence to support this finding.

■ What this paper adds?

In this quasi experimental study, we found evidence that Oketani breast massage was effective to reduce breast pain and increase breast milk pH. Because it was very difficult to compare with the difference in sweet taste, we measured the neonate's sucking speed per minute in 5 minutes after starting breast feeding, under the assumption that the baby will suck rapidly if the breast milk is sweet. Also the sucking speed of the neonates in experimental group was more rapid than that in control group.

■ Implications for practice, education and/or policy

Oketani breast massage could be effective in relieving breast pain and increasing breast milk pH as well as the sucking speed of neonates.