

A Comparative Study of the Effects of Mint Tea Bag, Mint Cream, and Breast Milk on the Treatment of Cracked Nipple in the Lactation Period: A Randomized Clinical Trial Study

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ABSTRACT

Background: The results of the previous studies on the effects of mint on cracked nipple are contradictory. The purpose of the present study was to compare the effects of mint tea bag, mint cream and breast milk on the healing of cracked nipple during lactation.

Methods: This study was a clinical trial with a control group, pre and post-test design conducted in health centers of Hamadan University of Medical Sciences, Hamadan, Iran from 2016 to 2017. Samples were divided into three groups (n=72 subjects in each group). Interventions were performed at least 4 times a day for 14 days after the start of treatment. Data were collected through the cracked nipple measuring checklist, the amount of wound and demographic questionnaire before the intervention and on 4, 8, and 14 days after the intervention. Data analysis was conducted using descriptive and inferential statistics in SPSS software (version 21).

Results: There was a decreasing trend in the mean score of crack pain on days 0-14 in the groups of mint cream, mint tea, and breast milk after the intervention; however, there was a statistically significant difference in the breast milk group (P<0.001). Moreover, with regard to within group comparison, there was a decreasing trend with a significant difference in the mean score of wound in three groups before the intervention (P<0.001) and on the fourth day after the intervention (P= 0.003).

Conclusion: The results of the present study indicated that breast milk was more effective than mint cream and mint tea in the treatment of cracked nipple.

Keywords: Cracked nipple, Mint cream, Mint tea

Introduction

The role of breastfeeding has been recognized essential for the health and development of children for many years (1). Nipple fissure refers to ulcers in the nipple due to the inappropriate breast sucking by the infant. Most mothers during lactation experience the symptoms of cracking and bulging usually accompanied by

irritation and pain (2). Exclusive breast feeding is one of the important factors in the reduction of mortality and infant complications (3, 4). Cracked nipple is a painful complication on the nipples of lactating mothers with different shapes such as curvilinear, branched or rectilinear (5, 6). Nipple fractures can act as

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bacteria entry sites and may cause abscess and mastitis (7, 8). The crack can create problems for the mother, infant, family, and community, including stopping breastfeeding which causes the infant to be deprived of the benefits of breast milk (9). The cracked nipple can be uncomfortable leading to painful lactation, and successful lactation prevention (10, 11). An open wound can be a pleasant environment for the colonization of staphylococcus aureus; therefore, the treatment of open wounds can reduce the risk of infection (12). The treatment of nipple crack is difficult since it is traumatized due to the repeated sucking of the infant and the constant contact of the flora of the infant's mouth. Therefore, the treatment time of nipple cracks is of great help in preventing pain, infection and other problems (13). Mothers can be supported through the assessment of education and corrective breastfeeding interventions for the treatment of wounds and nipple pain (14). It is estimated that 80-90% of women experience some types of nipple wounds, and 26% of them develop nipple cracks with excruciating pains. More than one-third of these mothers may change their feeding method in the first 6 weeks after birth (15, 16). Common nipple care and treatments include avoiding the use of shampoos or soaps, not drying with air, not leaving colostrum on the nipple after feeding, preventing nipple abrasion, and using bras with the edges hanging on the breast (17). Leaving milk on the nipple to dry is beneficial since breast milk has both softening and disinfection properties (18, 19); however, some believe that dry milk may accumulate in breast ducts and stimulate nipples. Therefore, cleansing areola with mild water and soap is required before and after lactation. One of the non-pharmacological treatments is the use of tea bag or hot water compressor. Hot compress can help improve wound healing through improving the blood flow in the wound area. Heat also reduces the amount of pain (20, 21). Peppermint is one of the mint species with medicinal properties. Due to the presence of menthol and phenol compounds (22, 23), it can also inhibit the activity of bacteria and fungi (24, 25). Topical use of mint essential oil especially ointment has a positive effect on the healing process of full-thickness infections through the prevention of inflammatory stages and tissue infection (25-28). Moreover, this herbal remedy especially when is used topically has no side effects for the mother and infant (29). Given the current tendency to use herbal medicines and

importance of breast milk to improve the wound caused by fissure in nipples, as well as the contradictory results of the previous studies, the researchers investigated the effects of mint tea bag, mint cream, and breast milk on the treatment of cracked nipple in the lactation period.

Methods

This study was a randomized clinical trial with a reverse block method. Samples were randomly selected of women suffering from cracked nipples referring to health centers in Hamadan in 2016. Totally, 32 health clinics in health and treatment centers were classified into three districts of south, north, and center concerning their social and economic statuses. Out of all, three health clinics were randomly selected from the south, three from the north, and three from the center. From each region and area one center was randomly assigned to group 1 (mint tea), one to group 2 (mint cream), and one to group 3 (breast milk). The sampling method was based on the following formula:

$$n = \frac{(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta})^2 \rho^2 (1-\rho)}{(d)^2}$$

Given type 1 error 5% and power of 80%, the effect size of 25% within the groups, 60 subjects were required in each group. Considering 10% drop outs of the samples, the sample size was determined to be 72 in each group (30).

The research was conducted after receiving permissions from the Department of Research and Ethics Committee (decree code: IR.UMSHA.REC.9508114598) affiliated with Hamadan University of Medical Sciences, Hamadan, Iran. Explanations regarding the research objectives were provided and information confidentiality along with voluntary participation were ensured to the subjects. Written consent forms were signed before the study. The questionnaires were confidential with no names and were completed by the researcher. Subjects were coded and the researcher was only informed of the codes. The participants were followed up by their codes in subsequent visits. Blinding was performed in the stage of evaluation of the results. Inclusion criteria to enter the study were: 1) lactating women with cracked nipples living in Hamadan city, 2) being literate and having at least one telephone line for future contacts, 3) having cracked nipples with a minimum score of 2 in the store scale, term

pregnancy, and singleton, 4) having a healthy newborn with a minimum weight of 2500-4000 grams, 5) exclusive breastfeeding, 6) lack of abnormalities in the newborn's mouth, palate, and jaw, 7) lack of abnormalities in the mother's nipples and previous nipple and areola surgery, 8) lack of previous treatment of cracked nipples from the past week, 9) lack of addiction and psychological problems of the mother, and 10) lack of any kind of internal-surgical diseases or infections.

On the other hand the exclusion criteria included 1) the use of a pacifier or milk bottle, 2) mothers' use of milking machine or plastic nipples, 3) the newborn's disease, 4) oral candidiasis of the newborn, 5) mother's use of antibiotics for mastitis, abscess, or breast candida albicans, 6) lack of follow up and checkup of mothers on determined days of the intervention, 7) lack of use of recommended treatments for at least one day and use of other treatments rather than the recommended ones.

All three groups were trained on correct breastfeeding through a pamphlet. Correct breastfeeding, position of the mother, and the infant were also checked. The pamphlet was standardized, designed by the Iranian Ministry of Health and was used in affiliated clinics. The use of proposed therapies was performed after breastfeeding. In the mint tea group a bag of mint tea (compressed tea bag, Golestan Company, Iran) was placed in a cup of hot water and allowed it to soak completely. After removing it and taking its extra water, it was placed on the nipple and areola around it for fifteen minutes, and was allowed to get dry. Mint tea bags were used four times a day. In the second group, after each breastfeeding, the mint cream was used with the following formula: Polysorbate 60g was solved in 100 ml of water (the water phase), and cetyl alcohol, benzoic acid and glycerol stearates were solved in mineral oil (organic phase). The water-organic phase was separately reached to 65° C; the water phase was added to the organic phase while stirring. Stirring continued until the temperature reached 20° C, at which the essence could be added to the product, and the product was packed in 100 gram tubes. In this group, mint cream was placed on the nipple and areola and before each breastfeeding, nipples and areola were washed. A fingertip of the cream was rubbed on the location of the nipple fracture and the surrounding areola. In the third group after each breastfeeding, some breast milk was

placed on the nipple and areola and was allowed to get dry in the air. These methods were used at least 4 times a day and were continued from day one to day 14 after the intervention onset.

Of the two questionnaires used in this study. The first one was The Score Factor Check Scale for Fracturing which examined the severity of the pain caused by the breast fracture. This checklist was completed once before the intervention, it was then refilled on days 4, 8, and 14 after the intervention onset by the researcher. The minimum and maximum scores in this checklist were zero and five, respectively. Scores 0-5 were assigned to each condition, such as, the painless breast bone with normal color and no tenderness (0); reddened breast or pain in the first 5-10 seconds of the start of lactation (1); red nipple and pain longer than 5-10 seconds lactation onset (2); pain occurred during lactation and caused abnormal movements at the lactation onset (3); nipple begins to crack and involuntarily starts pain when breastfeeding (4); a fissure in the nipple during breastfeeding and distributed pain throughout the body (5). Content validity of the checklists was confirmed by Storr and Kazemirad et al. in Iran (31).

The second questionnaire was the Checklist for Measuring the Amount of Ulcer (wound width) on the nipple and areola. This checklist evaluated wound width in the nipple. This checklist was once completed before the intervention and refilled on days 4, 8 and 14 after the intervention by the researcher. In addition, it was ranked as mild (1-2 mm), medium (3-9 mm), and extreme (>10 mm), or yellowish in color. The reliability of this checklist was shown in numerous studies (32). At the beginning of the study, images of the size of the wound were given to the women and the method of measuring the size of the wound was explained to them. During telephone follow ups, they were asked about the size of the wound. In suspicious cases, a photograph of the wound was sent to the researcher. Training for the use of drug therapies was carried out at the health clinic. Data were analyzed in SPSS software (version 21), and General Linear Model (repeated measure), ANOVA, and ANCOVA tests were also conducted. The significance level was set as $P < 0.05$.

Results

The collected data had a normal distribution and there was no significant difference within three groups in terms of quantitative demographic characteristics, including age, BMI, the number of

Table1. Comparison of the mothers' characteristics in the groups

Variables	Group (1)		Group (2)		Group (3)		Statistic results
	Mint herbal tea		Peppermint cream		Breast milk		
	Mean	SD	Mean	SD	Mean	SD	
Age(y)	28.02	5.55	27.80.	6.02	27.23	6.28	F=0.334 P=0.716
BMI	28.82	4.02	28.82	4.8	28.98	4.90	F=0.028 P=0.973
Parity	1.74	0.87	1.66	0.82	1.68	0.76	F=0.172 P=0.842
Infant age (month)	4.78	3.85	3.18	2.09	2.18	0.48	F=19.04 P<0.001
Number of breastfeeding/24 hrs	14.27	5.74	12.26	5.31	14.93	9.55	F=2.72 P=0.068
Duration of breastfeeding (min/24 hrs)	13.74	9.12	14.31	7.34	15	6.69	F=0.688 P=0.504
Infant weight (kg)	3.21	0.62	2.99	0.49	3.06	0.43	F=3.25 P=0.04
Gravida	1.17	0.14	1.95	1.13	2.26	2.37	F=0.627 P=0.535

Table2. Comparison of demographic characteristics of the groups

Variables		Group (1)		Group (2)		Group (3)		Statistic results
		Mint herbal tea		Peppermint cream		Breast milk		
		n	Percent	n	Percent	n	Percent	
The correct lactation technique	yes	18	25.7	12	16.7	4	5.6	P=0.005 Chi-2=10.6
	no	52	74.3	60	83.3	67	94.4	
	total	70	100	72	100	71	100	
Education	High school	53	73.6	64	88.9	66	91.1	P=0.002 Chi-2=20.8
	Academic	19	26.4	8	11.1	6	8.3	
	total	72	100	72	100	72	100	
Breastfeeding position	siting	55	25.7	60	83.3	60	83.3	P=0.699 Chi-2=.71
	lying	15	74.3	12	16.7	12	16.7	
	total	70	100	72	100	72	100	
Satisfaction of breastfeeding	yes	56	80	60	83.3	67	93.1	P=.07 Chi-2=5.3
	No	14	20	12	16.7	5	6.9	
	total	70	100	72	100	72	100	
Abortion	yes	18	25.7	19	26.4	17	23.6	P=.02 Chi-2=.16
	no	52	74.3	53	73.6	55	74.4	
	total	70	100	72	100	72	100	
Income	Less than one million	48	66.7	56	77.8	64	88.9	P<0.001 Chi-2=9.63
	1-2 million	15	20.8	14	19.8	8	11.1	
	More than 2 million	9	12.5	2	2.8	0	0	
	total	72	100	72	100	72	100	

deliveries, pregnancies ,and nursing hours per day, and the duration of breastfeeding per day ($P>0.05$, Table 1). In the mint tea group, the most accurate lactation technique was observed in 25.7% of the cases. The majority of the subjects in the mint cream and breast milk groups used a sitting position during lactation while in the mint tea group, a lying position was used. The majority of the subjects in the groups were satisfied with breastfeeding and had no history of abortion (Table 2).

In addition, in an intra-group comparison, a

decreasing trend was shown in the mean scores of crack pain on days 0-14 after the intervention (Table 3, 4). There was a significant difference in the breast milk group ($P<0.001$). In the intra-group comparison, there was significant differences within the three intervention groups ($P<0.001$). In the intra-group comparison of the three groups, there was a significant decreasing trend in the mean pain score on the fourth day and the 14th day after the intervention; therefore, the lowest mean scores were observed in the breast milk group (2 ± 0), the mint cream (2.44 ± 1.85), and

Table 3. Comparison of the severity of nipple pain in the groups

The severity of nipple pain crack	Day								** Statistical test results	Mean square	F	P-value
	0		4		8		14					
	Mean	SD	Mean	SD	Mean	SD	Mean	SD				
Mint herbal tea group (n=70)	2.58	1.18	1.00	0.69	0.42	0.57	0.31	0.07	P=0.17			
Peppermint cream group (n=72)	2.44	0.85	0.97	0.69	0.64	0.26	0.58	0.13	P=0.96	0.80	2.545	0.02
Breast milk group (n=72)	2.00	0.00	0.51	0.67	0.49	0.25	0.42	0.15	P<0.001			

*** In order to eliminate the difference between the groups in the mean baseline, ANCOVA method was used.

** Using the ANOVA test

* Using the General linear model (repeated measure)

Table 4. Comparison of covariance analysis of the nipple pain severity in mothers using peppermint water and breast milk adjusted for confounding variables

Source	Sum of Squares	Degree of freedom	Mean Square	F	Sig.
Intercept	51.394	1	51.394	52.167	.000
Group	13.207	2	6.603	6.703	.002
Duration of breast feeding	2.839	1	2.839	2.881	.091
Position	1.337	1	1.337	1.357	.245
Education of mother	.809	3	.270	.274	.844
How to put a baby's mouth	.177	1	.177	.180	.672
Monthly income	1.641	1	1.641	1.666	.198
Infant's age	2.923	1	2.923	2.967	.087

Table 5. Comparison of the severity of nipple and areola cracks in the groups

Groups	Day								** Statistical test results
	0		4		8		14		
	M	SD	M	SD	M	SD	M	SD	
Mint herbal tea group	1.38	0.54	0.65	0.56	0.31	0.49	0.07	0.31	P=0.39
Peppermint cream group	1.27	0.53	0.41	0.59	0.18	0.42	0.69	0.25	P=0.77
Breast milk group	1.01	0.11	0.34	0.50	0.18	0.38	0.09	0.29	P=0.8
* Statistical test results in three groups of intra-group comparisons	P<0.001		P=0.003		P=0.11		P=0.81		*** Statistical test results compared to the three groups P<0.001

*** In order to eliminate the difference between the groups in the mean baseline, the ANCOVA method was used.

** The ANOVA test

* The General linear model (repeated measure)

mint tea group (2.58±1.18). The Tukey test showed that the mean score in the breast milk group was significantly lower than that of the mint tea group (P<0.001). Furthermore, the mean of pain score in the breast milk group was significantly lower than that of the mint tea group on the fourth day after the intervention (P=0.003).

In the intra-group comparison of the mean scores of crack wound, there was a decreasing trend on days 0, however, there was no significant difference in any of the groups (P>0.05, Table 5, 6). There was a significant difference in the intra-group comparison of three intervention groups (P<0.001). In the intra-

group comparison of the three groups before the intervention (P<0.001) and on the fourth day after the intervention (P=0.003), there was a significant difference in the decreasing trend of the wound mean score as the breast milk group (1.01±0.11), mint cream (1.27±0.53), and mint tea group (1.38±0.38). As a matter of fact, the Tukey test showed that the wound mean score in the breast milk group was significantly lower than that of the mint tea and cream groups (P<0.001). On the fourth day after the intervention, the wound mean score of the mint tea group was significantly lower than that of the breast milk group (P=0.003) and the mint cream group (P=0.029).

Table 6. Comparison of covariance analysis of the nipple severity and areola cracks in mothers using peppermint water and breast milk adjusted for confounding variables

Variable	Sum of Squares	Degree of freedom	Mean Square	F	Sig.
Intercept	14.030	1	14.030	35.664	.000
Group	4.248	2	2.124	5.399	.005
Duration of breast feeding	1.654	1	1.654	4.204	.042
Position	.265	1	.265	.673	.413
Education of mother	.115	3	.038	.098	.961
How to put a baby's mouth	6.021E-5	1	6.021E-5	.000	.990
Monthly income	1.416	1	1.416	3.598	.059
Infant's age	.628	1	.628	1.595	.208

Discussion

The results of the current study indicated that the mean score of wound among the groups was significantly lower in the breast milk group than that of the mint tea and cream groups. In a study by Eshghizadeh et al., the severity of pain in the breast milk group was lower than that of other groups. The results of the above-mentioned study were consistent with the present study (22, 33). In a study conducted by Pugh et al. (1996) on comparative factors for nipple pain relief and breast-feeding, there was no statistically significant difference within the groups in terms of pain severity and duration of lactation.

However, the severity of pain in the present study was significantly lower in breast milk than the peppermint and peppermint cream groups. The results of the aforementioned study were in contrast to the present study (34). Akbari et al. showed that pain soothing of nipple crack was greater in the menthol essence group than that of the breast milk group. The result of the mentioned study was not compatible with the results of the present study (35). Mohammadzadeh et al. demonstrated that, the amount of pain in the breast milk group was lower than that of the lanolin group. The results of this study also indicated that, breast milk reduced the severity of crack pain compared to other groups, which was consistent with the results of the present study (36). In a study by Thabet et al. (2013), on the effect of mint extract on the prevention of breast fractures during lactation, pain in women in the peppermint group was less than in the breast milk group. However, in the present study, the pain intensity was lower in the breast milk group. Therefore, the result of this study was in contrast to the result of the current study (32). Melli et al. (2007) investigates the effects of pheremona gel, lanolin ointment, and placebo gel on nipple cracking. They showed that the incidence of breast pain in the group receiving mint was lower than the other groups, while in the present study, the

severity of pain was lower in the breast milk group. The results of the aforementioned study and the present study were contradictory (37). Along with determining the mean score of crack wound in the pre and follow-up days after the intervention in the groups, the wound restoration rate in the breast milk group was greater than that in other groups. In a study performed by Kazemirad et al. , the severity of crack pain in the Calendit-E group was lower than that of the breast milk group, which contradicted with the results of the present study (38).

Eshghizadeh et al. argued that breast milk and olive oil could have similar effects or at least their effects might be related only to breast milk. In the current study, considering the fact that, the amount of wound in the breast milk group was less than that in the mint tea and cream groups, the results of both studies were consistent with each other (33). In the study by Lavrgen et al. , tea and hot water compresses were more effective than no treatment. In the present study, mint tea compress was in the last rank compared to breast milk and mint cream (39).

Walker et al. pointed to the beneficial effects of green tea bags, peppermint, virgin olive oil, honey, and coconut oil in the treatment of nipple crack (40). In a study by Mohammadzadeh et al., the recovery time varied in groups; on average, the recovery time in the lanolin group was longer than that in the breast milk and control groups, which was consistent with that of the present study. The results of this study indicated that breast milk intervention was more effective than other two treatments to improve cracked nipple during breastfeeding (36). In another study conducted by Akbari et al., in the menthol essence group the rate of wound healing was reported to be higher than that of the breast milk group(35). In the present study, the wound recovery rate in the breast milk group was higher than that of the mint cream and tea groups; therefore, the result of

the aforementioned study contradicted with the current study findings.

Conclusion

Despite the support of other studies for the treatment of nipple crack, breast milk was more beneficial, convenient, inexpensive, and non-medicinal. There is no need for washing and no secondary nipple trauma in using it locally. Therefore, breast milk is a natural and biologic for the body and is always available without side effects. It can be used in all social and economic groups in the society and should be recommended for the treatment of mild nipple cracks. According to the results of the present study, breast milk is effective in nipple wound healing and pain relief during the breastfeeding period compared to mint cream and mint tea; therefore, the use of breast milk is recommended for the recovery of nipple crack and pain relief.

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Conflicts of interests

None declared by the authors.

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