ORIGINAL ARTICLE

The Effect of Aromatherapy Treatment on Fatigue and Relaxation for Mothers during the Early Puerperal Period in Japan: A Pilot Study

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Abstract

Background: Early in the postpartum period, mothers are often nervous and tired from the delivery, breast-feeding and caring for a new-born. The aim of this study was to evaluate the process and outcome of using aromatherapy treatments to increase relaxation and decrease fatigue for mothers during the first to the seventh day of the postpartum period.

Methods: This non-randomized controlled study with a quasi-experimental one-group pretest-posttest design was used to evaluate scores in relaxation and fatigue before and after the intervention. Aromatherapy hand treatments were performed on a purposive sample of 34 postpartum mothers in Tokyo, Japan, from May to July 2016. The single treatment included a choice of one of five essential aroma oils through hand and forearm massage. Relaxation and fatigue were measured by self-administered valid and reliable questionnaires. Wilcoxon signed-rank test was conducted to analyze the data before and after the intervention. The software programs SPSS, v. 23.0 (SPSS, Tokyo), was used to analyze the data, with the significance level set at 5%.

Results: Valid responses were obtained from 29 participants. A comparison of the scores before and after aroma treatment intervention indicated that the participants' relaxation scores increased significantly ($P<0.001$) and fatigue scores were significantly reduced ($P<0.001$). The majority of participants (77.8%) were satisfied with the treatment.

Conclusion: The aroma treatments significantly improved relaxation and reduced fatigue for mothers in the early puerperal period and were well received. Therefore, a larger study using a pretest-posttest random control trial is recommended.

Keywords: Aromatherapy, Postpartum period, Fatigue, Relaxation

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Introduction

Early in the postpartum period, mothers feel tired due to the delivery, and increased fatigue due to breast-feeding and infant-care.[1] While postpartum mothers experience other physical conditions in addition to fatigue and physical exhaustion, such as sleep-related problems, pain, sex-related concerns, hemorrhoids, constipation, and breast problems, fatigue is a major concern.[1] Fatigue, operationally defined as the subjective report of exhaustion and decreased capacity for both physical and mental activity,[2] is reported in 80% of early postpartum mothers.[3] Most commonly reported health problems in the postpartum period were fatigue, sleep disturbance, and dysuria.[4] The higher levels of fatigue are associated with more disturbed sleep.[5] An additional cause of increased fatigue of postpartum mothers is anemia, and improvement of anemia is important.[6] Postpartum mothers spend stressful periods due to sleep deprivation, sleep disturbance, and fatigue.[7] Fatigue in early postpartum is significantly related to postpartum depression and is a predictor of postpartum depression,[8] while approximately 60% of postpartum mothers have moderate fatigue, which is significantly associated with maternal health.[9]

These factors make it more difficult for women in the postpartum period to be relaxed. Yet, relaxation could significantly reduce anxiety disorders[10] and integral to infant care is breast-feeding, which requires relaxation to promote the 'let-down' response of oxytocin. While the majority of mothers recover from fatigue, through the body's natural healing power, those mothers who had fatigue reduction were less likely to experience difficulty of direct breastfeeding.[11] The use of aromatherapy has demonstrated a potential for promoting relaxation. The essential oils in aromatherapy treatments promote relaxation when the fragrant component stimulates the hypothalamus, and activates the parasympathetic nervous system.[12] Therefore, increased relaxation and fatigue reduction are produced by the fragrance of essential oil and application through effleurage to the forearm.

The effects of using aromatherapy in the medical field have been reported; blood pressure and anxiety were reduced,[13] and a reduction of confused behavior in patients with dementia was reported.[14] Results of using aromatherapy full-body massage for postpartum mothers indicated a significant decrease of the maternity blues score, decrease in the State-Anxiety Inventory score, increase in the Profile of Mood States,[15] and suppression effects of fatigue and postpartum depression using aromatherapy foot bath.[11] A decrease of the anxiety scores was associated with using aromatherapy slow-stroke back massage.[16] Breathing essential oils provided reduced stress, anxiety, and depression for postpartum mothers.[17] Also, there was a significant improvement in postpartum mothers' sleep quality after inhalation of essential oil,[18] and there was a promotion of better physical and mood, which provided comfort for mothers after using essential oil aromatherapy treatments.[19]

From the results of these surveys, aromatherapy treatments could be appropriate for postpartum mothers experiencing nervousness and fatigue. However, the importance of brief aromatherapy treatment using hand massage by nurses for reducing fatigue and relaxation in postpartum mothers has not been established. Therefore, the present study was designed to evaluate the implementation of brief and short-term aromatherapy hand massage for mothers in a post-partum setting as the previous stage for the large comparative study. Evaluation of this intervention could provide an evidence-based rationale for developing aromatherapy relaxation care for postpartum mothers by nurses. This study was a pilot study, aiming to provide information for a large-scale comparative study. The aim of the study was to evaluate the process and outcome of using aromatherapy treatments to increase relaxation and decrease fatigue for hospitalized mothers during the first week of the postpartum period.

Materials and Methods

Design

This was a non-randomized controlled trial study of a quasi-experimental single group pretest–posttest research design using a purposive sample.

Participants and Setting

Participants were mothers in their early postpartum period (day one – 7) who had been admitted prior to delivery to a general hospital in Japan. The hospital was a large-scale general hospital with a 52-bed maternity unit in Tokyo, Japan. It had perinatal and life-saving transport support. The mean age of the hospitalized mothers was early 30s. The ratio of cesarean sections was 27.7%. Consistent with maternity care in Japan, the length of stay was typically four to five days for a normal delivery and eight days for a cesarean section.[20]

Inclusion criteria were: (1) after normal delivery on day one to day four or repeat cesarean section postoperative day two through seven, (2) fluent in Japanese, and (3) permission to participate by the primary physician. Exclusion criteria were patients with: (1) emergency cesarean section, (2) severe psychiatric disorders, or (3) allergic reactions, reddening and eczema.

The number of participants needed for the study was calculated using the estimation method developed by Cohen (1992).[21] The intervention effect was calculated for a significance level of alpha=0.05, power=0.80, and effect size to γ=0.80. Thus, the calculation formula indicated a sample size of 28 participants. Dropout rate was anticipated at 26% based on an interventional study on providing people with caomfort.[11]

$$n \geq \frac{2*(Z_{1-\alpha/2}-Z_{\beta})^2}{d^2} = \frac{2*(1.960-(-0.842))^2}{0.8^2} = 24.5$$

Applying the results of Cohen's formula and the anticipated dropout rate yielded, n ≥24.5÷(1-0.26)=33.1. Therefore, the target sample size was set at 34 participants.

Intervention

In this study, the treatment included applying one of five types of essential aroma oil (pure lavender, ylang-ylang, citron, rosewood, and sweet orange) through massage to the mother's hands and forearms. The treatment providers were eight research assistants. During their year-long preparation, they attended various training sessions and seminars provided by the Certified Nurses of Japanese Society of Aromatherapy and gained experience through related volunteer activities. In addition, the research assistants passed a technical qualifying examination for independent professional skills, and a lecture regarding puerperium care.

Aroma treatments used a blend of sweet almond oil as the carrier oil and the essential oil. In addition, using the method described by Tillett et al. (2010),[22] we diluted the concentration of the essential oil to within 2% (considered a mild dilution) for women in the early postpartum period.

Prior to the treatment, the research assistants told the participants verbally and in writing about the efficacy of various aromas of the oils. Participants were then able to smell each one, and then they selected the oil for their treatment. To ensure safety, prior to beginning the treatments, the participants received a patch test to determine if they might have an allergic reaction to the ingredients of the aromatherapy.

Research assistants used the massage method described by Hashemi et al. (2015).[23] Treatment consisted of using the optimal effleurage as a basic technique so that the oil on the palm was spread thoroughly across the entire palm, and then the participants' hand and forearm were slowly and gently stroked in order to promote the flow of blood and lymph. Treatment was provided beginning on the left side and then the right side; it was conducted for approximately 20 minutes. Each participant received 1 aromatherapy treatment, which took place in a private room and either sitting or lying down. The room temperature was maintained at approximately

25 degrees Celsius. The rationale for the treatment options as to the time setting without burden on massage,[24] and the treatment using effleurage was explained by the researcher.[23]

Procedures

The researchers recruited the participants during their hospital stay after childbirth using purposive sampling, assisted by the nurse manager of the hospital. After the mothers' delivery, the researchers and the nurse manager confirmed that they met the inclusion criteria.

The researchers also informed the mothers verbally and in writing about the study's purpose as well as about confidentiality, anonymity, and safety of personal data. If the mothers agreed to participate in the study, the researcher obtained their written consent and provided an explanation of their right to withdraw from the study without penalty, and provided the mothers with a withdrawal from the study form. The participants were also informed that they had the option to mail the withdrawal form if necessary. The data collection period was from May to July 2016.

The self-report questionnaires were administered during their hospital stay and the completed questionnaires were placed in a secure box on the unit, providing convenience and anonymity. Data collection of the outcome evaluation was carried out for the pre-test and post-test. The pre-test was requested the day before the intervention, and the post-test request was for the current day, after about 24 hours of the pre-test. The timing of the posttest immediately after the intervention was informed by the research conducted by Nakakita and Takenoue (2009)[24] and Imura et al. (2006),[15] and in consideration for postpartum mothers breast-feeding schedule and child-rearing education classes.

Ethical Considerations

This study was conducted after obtaining approval from the Ethics Committee for Epidemiological Studies at Tokyo Healthcare University Tokyo, Japan (approval no. 27-27) dated 28 December 2015. Following the Declaration of Helsinki, a written explanation was provided to the participants regarding the study objectives, methods, protection of anonymity, and voluntary basis of participation. It also explained that the collected data would be used only for this study. The researcher obtained a signed informed consent from each participant.

Outcome Measures

The demographics and outcome measures included fatigue and relaxation scales and the researcher developed the outcome evaluation. The measures provided both quantitative and qualitative data.

Fatigue scale

Fatigue was assessed using the *subjective symptoms* 13-item subscale of the Self-Diagnosis Checklist for Assessment of Worker's Accumulated Fatigue.[25] In Japan, it is widely used for fatigue investigation of mothers because the scaling is convenient and provides ease of response. Although constructed for a working population, it had been modified to 12 items after the validity was examined.[26] The reliability of the scale was established based on its Cronbach's alpha coefficient range, 0.72-0.84.[26] Although the participants were instructed to rate their psychological health during the previous month, in the present study, they were asked to consider their current symptoms. The scale consists of 12 items with four response categories ranging from 0 (no fatigue) to 3 (higher fatigue). Higher scores indicate higher fatigue. A score from 5 to 10 is slightly higher fatigue, an da score of 11 and above is indicate as higher fatigue. The Cronbach's alpha coefficient range of the scale in this study was 0.70-0.77.

Relaxation Scale

The relaxation was evaluated using a revised version of the rating scale of emotion using the items referring to relaxation. Nedate and Kamisato (1984) developed this

as a measurement of a subjective sense of relaxation.[27] Takahashi (1996) revised it to increase item representation.[28] The relaxation scale is a four-item inventory: "I feel laid-back" "I feel unclenched" "I feel relieved" and "I feel in a receptive mood". The response categories range from 0 (strongly disagree) to 10 (strongly agree). Higher scores indicate the presence of higher relaxation. Takahashi (1996) reported that the instrument had acceptable reliability (Cronbach's alpha coefficient, 0.81-0.87).[28] The Cronbach's alpha coefficient of the scale in this study was 0.89.

Process Evaluation

The participants completed the researcher-developed five-item survey: (1) treatment satisfaction, (2) match of expectations, (3) adequacy of intervention time, (4) satisfaction receiving essential oils, and (5) provider's thoughtfulness. A five-point Likert scale was used for each item, with higher scores indicating more positive acceptance of the intervention. In addition, the participants responded to an open-ended question seeking their opinion about the intervention.

Statistical Analysis

The software SPSS, version 23.0 (SPSS, Tokyo), was used for data analysis, with the significance level set at 5%. Comparison test was carried out, both before and after, using a nonparametric test because the scales were not normally distributed by Shapiro-Wilk test. The changes before and after the intervention for the participants were analyzed using a Wilcoxon signed-rank test. A frequency distribution table was created from the five items of the process evaluation. The open-ended remarks were analyzed using constant comparative analysis as described by Lyn (2015).[29]

Results

During the study period, 34 questionnaires were distributed among mothers eligible for participation. Although 32 questionnaires (94.1%) were returned, 29 were usable for analysis; therefore, the response rate was 93.8%. There were four (14.7%) dropouts because of cancellation, lack of data, and no return (Figure 1). Characteristics of the participants are shown in Table 1. There were 6 pregnancy

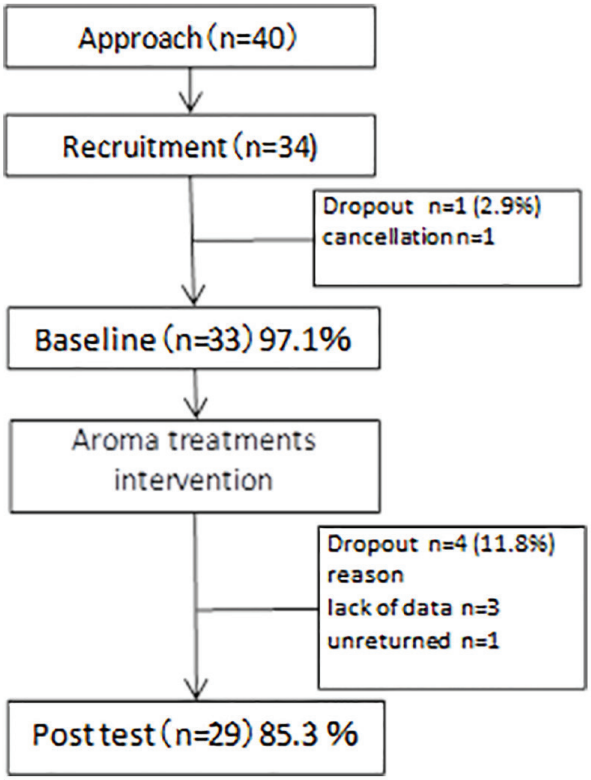

Figure 1: Flowchart of study participants

anemia and 4 threatened premature labor as pregnancy complication. There was no thyroid disease complication during pregnancy.

Table 1: Attributes of the study population

Attributes	Participants (N=29)
	Mean±SD
Age (years)	32.5±4.0
Range	(21~40)
Puerperal days	3.2±1.6
Range	(1~7)
Delivery methods	N (%)
Normal vaginal	21 (72.4)
Caesarean section	8 (27.6)
Birth experience	
Primipara	22 (75.9)
Multipara (2 times)	6 (20.7)
Tertipara (3 times)	1 (3.4)
Previous disease	
Yes	1 (3.4)
No	28 (96.6)
Pregnancy complication	
Yes	10 (34.5)
No	19 (65.5)
Selected essential oil	
Citron	9 (31.0)
Sweet orange	8 (27.6)
Rosewood	5 (17.2)
Pure lavender	4 (13.8)
Ylang-ylang	3 (10.3)

Display % the proportion of the number of valid responses

There were significant differences between the pretest - posttest in the two scales: Fatigue (P<0.001) and Relaxation (P<0.001) based on the Wilcoxon signed-rank test (Table 2). Moreover, Wilcoxon signed-rank test was conducted for each scale according to the participants' attributes (Table 3). There were significant differences between the pretest-posttest for each attribute in the Fatigue scale items: age 31-35 (P<0.01), age 36-40 (P<0.05), puerperal day three (P<0.05), no pregnancy complication (P<0.01). There were significant differences between the pretest-posttest for each attribute in the Relaxation scale items: puerperal day three and four (P<0.05). There were significant differences between the pretest - posttest in Fatigue and Relaxation for participants who selected citron essential oil (P<0.05), and those who selected sweet orange essential oil (P<0.05).

In the evaluation process, 77.8% of the participants were satisfied with the treatment methods; 89.6% felt the implementation time was appropriate, and 89.6% felt increased comfort. The majority (72.4%) of the participants indicated a high agreement between their expectations and

Table 2: Comparison between pre-posttests of fatigue and relaxation

Variables	Pre test		Post test		P value*
	Median	IQR[a]	Median	IQR[a]	
Fatigue	10.0	(5.5-14.5)	5.0	(2.5-8.5)	<0.001
Get annoyed	0.0	(0.0-1.0)	0.0	(0.0-0.0)	<0.05
I am anxious	1.0	(0.0-2.0)	0.0	(0.0-1.0)	<0.01
Uncomfortable	0.0	(0.0-1.0)	0.0	(0.0-0.0)	<0.01
Depressed	0.0	(0.0-0.0)	0.0	(0.0-0.0)	0.102
Feel lousy	1.0	(0.0-1.0)	0.0	(0.0-1.0)	0.187
Can't focus	1.0	(0.0-1.0)	0.0	(0.0-1.0)	0.058
Often make mistakes	0.0	(0.0-1.0)	0.0	(0.0-1.0)	0.317
Very sleepy during child care	1.0	(1.0-3.0)	0.0	(0.5-1.0)	<0.05
Unmotivated	0.0	(0.0-0.5)	0.0	(0.0-0.5)	1.000
I am exhausted	1.0	(0.0-1.0)	0.0	(0.0-1.0)	<0.05
Tired out in the morning	1.0	(0.0-1.0)	1.0	(0.0-1.0)	0.340
More tired than previous	1.0	(0.5-3.0)	1.0	(0.0-1.0)	<0.05
Relaxation	20.0	(15.0-27.5)	35.0	(31.0-40.0)	<0.001
Feel laid-back	6.0	(4.5-7.0)	10.0	(8.0-10.0)	<0.001
Feel unclenched	5.0	(3.0-6.5)	9.0	(8.0-10.0)	<0.001
Feel relieved	5.0	(3.0-7.5)	9.0	(7.5-10.0)	<0.001
Have a receptive mood	5.0	(3.0-7.0)	8.0	(6.0-10.0)	<0.001

*Wilcoxon signed-rank test; a: Inter Quartile Range

Table 3: Comparison among pre-posttests of fatigue and relaxation by participants' attributes

Participants' Attributes	n	Fatigue					Relaxation				
		Pretest		Post test		P value*	Pretest		Post test		P value*
		Median	IQRa	Median	IQRa		Median	IQRa	Median	IQRa	
Age (years)											
Under 30	7	8.0	(8.0-18.0)	7.0	(1.0-12.0)	0.128	19.0	(11.0-27.0)	39.0	(28.0-40.0)	<0.05
31-35	14	10.0	(6.0-15.0)	6.0	(4.0-9.0)	<0.01	20.0	(14.0-28.8)	33.0	(25.3-39.3)	<0.01
36-40	8	7.5	(2.8-11.5)	2.5	(1.3-7.0)	<0.05	23.0	(18.5-30.5)	38.0	(32.5-40.0)	<0.05
Puerperal days											
day 1	3	10.0	(6.0-10.0)	4.0	(10-7.0)	0.109	15.0	(14.0-26.0)	39.0	(35.0-40.0)	0.109
day 2	6	10.0	(6.5-16.0)	7.5	(6.0-7.5)	0.131	20.5	(17.3-28.8)	32.0	(27.5-40.0)	0.080
day 3	8	9.0	(3.5-16.5)	5.5	(1.0-8.8)	<0.05	12.0	(5.0-26.3)	32.0	(28.3-34.0)	<0.05
day 4	9	8.0	(5.0-9.5)	4.0	(2.5-7.5)	0.203	24.0	(19.0-32.0)	40.0	(33.0-40.0)	<0.05
day 5	2	14.5	(10.5-12.0)	3.5	(1.5-4.5)	0.180	26.0	(15.0-24.8)	39.5	(29.3-30.8)	0.180
Mode of delivery											
Normal vaginal	21	10.0	(5.0-13.5)	6.0	(3.5-6.0)	<0.01	21.0	(14.5-27.5)	34.0	(31.0-39.5)	<0.001
Caesarean section	8	8.5	(6.5-14.8)	4.0	(2.0-8.5)	<0.05	18.0	(17.3-29.0)	40.0	(25.5-40.0)	<0.05
Parity											
Primipara	22	9.5	(5.8-11.3)	5.5	(2.8-9.0)	<0.01	20.0	(15.0-24.3)	34.5	(31.5-40.0)	<0.001
Multipara	7	12.0	(5.0-18.0)	4.0	(2.0-8.0)	<0.05	31.0	(13.0-33.0)	36.0	(29.0-40.0)	<0.05
Medical history											
Yes	1	14.0		2.0			32.0		40.0		
No	28	9.5	(5.3-14.3)	5.5	(3.0-8.8)	<0.001	20.0	(15.0-26.8)	34.5	(30.5-40.0)	<0.001
Pregnancy complication											
Yes	10	10.0	(7.5-15.0)	7.0	(2.8-12.5)	0.057	19.5	(15.0-29.0)	33.5	(19.3-40.0)	<0.05
No	19	8.0	(5.0-12.0)	4.0	(2.0-8.0)	<0.01	21.0	(14.0-26.0)	36.0	(32.0-40.0)	<0.001
Essential oil chosen											
Citron	9	10.0	(4.0-15.0)	4.0	(2.5-8.5)	<0.05	20.0	(17.0-26.0)	39.0	(35.5-40.0)	<0.05
Sweet orange	8	7.0	(5.0-8.0)	3.5	(1.3-6.8)	<0.05	19.5	(17.3-27.0)	40.0	(32.5-40.0)	<0.05
Rosewood	5	18.0	(11.0-20.0)	11.0	(8.0-21.0)	0.465	25.0	(2.0-33.5)	34.0	(32.0-39.5)	0.068
Pure lavender	4	10.0	(4.8-10.0)	4.0	(1.0-8.5)	0.068	20.5	(9.8-27.5)	31.5	(17.5-38.8)	0.109
Ylang ylang	3	10.0	(5.0-18.0)	7.0	(4.0-7.0)	0.109	20.0	(13.0-33.0)	32.0	(29.0-36.0)	0.109

*Wilcoxon signed-rank test; a: Inter Quartile Range

the implementation, and 93.1% evaluated the treatment methods as a considerate and thoughtful act (Figure 2). The results of the content analysis of the open-ended responses revealed five categories: (1) increased relaxation, (2) gained a comfortable feeling, (3) treatment matched expectations, (4) need for improvement of techniques, and (5) need for improvement of thoughtfulness. Comments included both affirmative opinions and suggestions for future improvements.

Discussion

The aromatherapy treatments for early postpartum mothers revealed reduction of fatigue and increase in relaxation. Thus, it was considered that receiving aromatherapy was a benefit for mothers with fatigue and nervousness during the postpartum hospitalization. In particular, it was confirmed that both the citron and the sweet orange essential oils were associated with significant improvements in both fatigue and relaxation. The results of the process evaluation indicated a high level of satisfaction with the treatment and intervention time. The contents and methods of aromatherapy treatments were considered to meet the mother's needs.

Most mothers during the early postpartum experienced poor sleep and fatigue.[30] Fatigue had a positive correlation with sleep disturbance.[5] Therefore, in order to ensure a good quality sleep for postpartum mothers, it is necessary to alleviate fatigue. An interesting finding was that the aromatherapy treatment was more effective against fatigue on the mothers' third day postpartum and for those who were in their 30s. The feeling of relaxation was effective on the fourth day postpartum. Maternity blues occur more often on the day three of the postpartum; generally, emotional changes associated with the childbirth occur on day five of the postpartum until the end of the postpartum period.[31] Therefore, research on the effectiveness of the intervention against fatigue and promotion of relaxation during days three and four of the postpartum is recommended to be conducted. In the present study, the reduction of the accumulated fatigue and increase of relaxation were significant in both primiparas and multiparas. Future studies using a control group would help to distinguish between the expected recovery and increased recovery related to aromatherapy.

The process evaluation obtained high satisfaction ratings by participants having either a vaginal delivery or cesarean section. The satisfaction level of the pilot study was high and its usefulness was confirmed. However, there is a need for some improvement in technique and thoughtfulness. Research assistants would benefit from further training and practice for improvement of techniques and thoughtfulness.

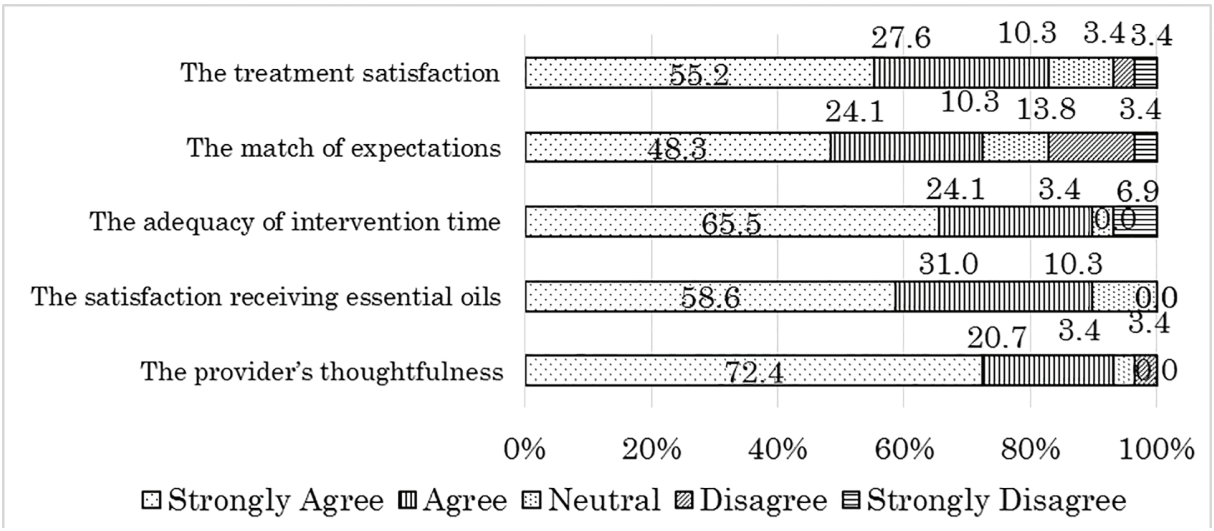

Figure 2: The process evaluation (N=29)

The mothers in the early postpartum period require care for fatigue reduction and relaxation; there is a need for dissemination of aromatherapy treatments as an integrated component of nurses' care.[32] Aromatherapy treatment is part of the holistic care that brings relaxation and symptom reduction in the area of nursing; it can be easily used by nurses and, therefore, is a great advantage. Increasing the mothers' motivation for childcare goals may begin in the hospital if the mother is not too tired or upset. Therefore, the establishment of aromatherapy in many facilities could support the mothers' motivation.

The healing care using aromatherapy has produced a decreasing trend of fatigue.[11] The present study also reduced fatigue. Further research on the dissemination of this intervention is recommended because the aroma treatments in the present study required approximately 20 minutes for the hospitalized puerperal mothers and could be easily implemented by nurses. It is convenient and easier once the nurses master the aroma treatment techniques.

There were some limitations in this study. First, the design of this study was a single group pretest-posttest design; because it was not subjected to an intervention group and a control group comparison (including a massage only group), the internal validity for the intervention effect was weaker. Also, it is not known how long the effect lasts as there was only one post-test. Second, because this study had a small sample size and the location of data collection was only a single hospital, there is limited generalizability and potential bias. Third, there were variations by a few hours in completing the post-test after the intervention. This was due to the timing of meals and breastfeeding. However, valuable data for an expanded study were obtained, which was a goal of this pilot study.

Conclusion

During the early hospital postpartum period, 29 mothers received aromatherapy treatments as a single group in a pre-post-test design. Participants showed a significant decrease in fatigue, and increase in relaxation. Significant findings indicated effectiveness of the essential oil of citron or oranges on puerperal day three, and without pregnancy complications in mothers over 30 years. In addition, a majority of the participants were satisfied with the intervention and felt it augmented their comfort level.

In the future, in order to obtain a basis for determining the effect, it is necessary to use a design that controls for more threats to internal validity such as a large-scale three-group comparison and a longitudinal random control trial including a setting where the comparison groups do not receive the aroma treatments. It is also necessary to increase the amount of training and practice for improvement of the techniques and thoughtfulness for treatment providers.

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Conflict of Interest: None declared.

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