Effect of Foot Massages on Postpartum Comfort and Pain Level of Mothers After Vaginal Delivery

A Randomized Trial

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This study conducted on 66 mothers aimed to investigate the effect of foot massages postpartum using an introductory information form, the Postpartum Comfort Scale, the visual analog scale, and a drug follow-up card. It was concluded that foot massages positively improved comfort, reduced pain levels, and reduced unnecessary medications. **KEY WORDS:** *comfort*, *massage*, *pain*, *postpartum period* *Holist Nurs Pract* 2021;35(3):140–149

The "postpartum period" refers to the period that begins 1 hour after the birth of the fetus and excretion of the placenta and lasts for 6 to 8 weeks, during which involution of the uterus occurs, where most of the mother's system returns to the prepregnancy state, and maternal, infant, and family adjustment is achieved.[1,2] Mothers experience pain at different levels during this period, as the pain thresholds of mothers vary. Although pain is subjective, mothers can generally define their pain.[3] During the postpartum period, mothers may benefit from nonpharmacological pain control techniques that aim to alleviate the severity of pain while eliminating the serious side effects of pharmacological methods.[4]

Midwives play important roles in the application of different nonpharmacological techniques in pain relief, and foot massage is one of these techniques.[5] Approximately 10 to 15 minutes of foot massage can be used as a complementary method to reduce the need for postpartum pain medication. In addition, foot massage may be useful for midwives and nurses because of its ability to reduce the need for additional intervention for pain.[6] The reason being nociceptors, which are relatively unspecialized nerve cell endings that initiate the sensation of pain and are also sensory receptors that send pain signals. Nociceptors are usually found on the surface of the inner tissues and beneath the skin and densely populate the feet. As such, foot massage is considered an important and appropriate method to reduce pain.[7,8]

In the literature, several studies have reported on nonpharmacological methods that are used to relieve pain during the postpartum period of mothers after cesarean delivery.[7,9-14] However, there appears to be no available studies on the effectiveness of foot massages on relieving pain, increasing comfort, and reducing the need for analgesic drugs in mothers who underwent vaginal delivery. In this study, mothers' reported pain was relieved, their comfort levels increased, and the need for analgesic medications reduced to a minimum level or alleviated by the application of foot massages during their postpartum period.

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MATERIAL AND METHODS

Design and patients

This is a randomized controlled experimental study that aimed to investigate the effect of foot massages on postpartum pain and comfort levels of mothers

after vaginal deliveries and its effectiveness in reducing the need for analgesic medications. The study complies with the Helsinki Declaration and was approved by the Ethics Committee for Clinical Research of the Ege University, Faculty of Medicine (document no. 140256/208, dated June 1, 2017).

Research data were collected during postpartum reviews at the Izmir Buca Maternity and Child Diseases Hospital between July 1, 2017, and August 31, 2017. In experimental studies, it is commonly recommended that at least 30 individuals must be included in each sample group to use parametric tests. Considering a possible 10% attrition as a result of participant withdrawals,[15] both the study and control groups consisted of 33 mothers. To ensure that the groups were not affected by each other, the data of the groups were collected at intervals of 1 week based on the data inclusion criteria (first week—study group, second week—control group, third week—study group, fourth week—control group, and so on).

The adequacy of the sample size was determined by performing power analysis. A statistical and power analysis size software (NCSS-PASS, NCSS Statistical Software; NCSS LLC, Kaysville, Utah) was used for power analysis. In this program, the difference between the average of the first and the final score of the Postpartum Comfort Scale (PCS) of each group was taken, and as a result of the calculation, the sample n = 66 was found to be 100% strong.

Mothers participating in this research needed to meet the following inclusion criteria: (i) primipara (mothers who had their first births), (ii) normal vaginal delivery, (iii) history of episiotomy, (iv) volunteered to participate in the study, (v) recruitment within the first 24 hours of delivery, (vi) no complications in the baby or the mother, (vii) mothers aged 18 to 35 years, (viii) no history of other complementary therapy given simultaneously, (ix) healthy feet without any wound, infection, or other cause for discomfort, and (x) able to read and write (Figure 1).

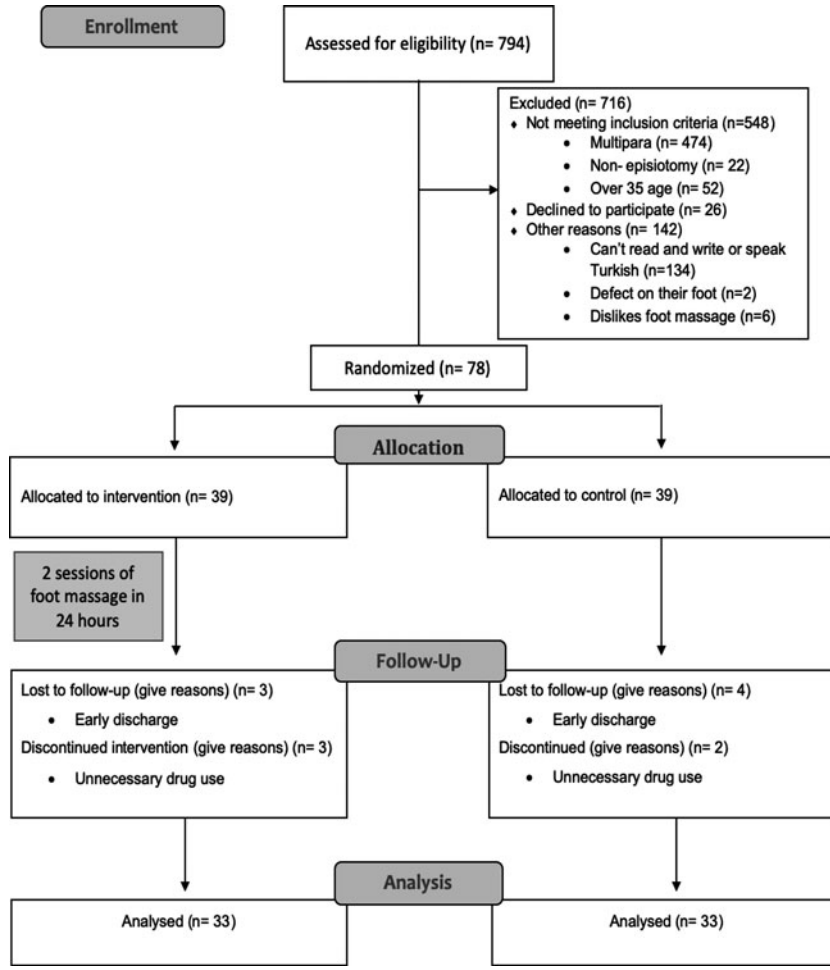

FIGURE 1. Consort flow diagram of the participants.

Data collection tools

After receiving informed consent, data collection forms were completed by a single researcher by face-to-face interview. The introductory information form (IIF), the PCS, the visual analog scale (VAS), a drug follow-up card (DFC), and a brochure were used as data collection tools.

- *Introductory information form:* The form created by the researcher consists of 31 questions about the family, pregnancy, birth, and newborn characteristics.
- *Postpartum Comfort Scale:* It was developed by Karakaplan and Yildiz based on the General Comfort Questionnaire, which was developed by Katharina Kolcaba and whose validity and reliability study was performed in Turkey. It is a 5-point Likert-type scale scoring system comprising 34 items to determine the postpartum comfort. The lowest and highest scores on the scales are 34 and 170, respectively. It has 3 subdimensions: physical, psychospiritual, and sociocultural.[16]
- *Visual analog scale:* It is a continuous scale consisting of a horizontal or vertical line and is usually 10 cm (100 mm) in length.[17] Pain intensity is ranked on a line from "no pain" with 0 points to "very severe pain" with 10 points.[18]
- *Drug follow-up card*: It is a follow-up card prepared by the researcher and contains the name and surname of the mother, the name of the drug given to the mother, the route of administration, date/time, and dose.
- *Brochure:* It is prepared by the researcher and contains information such as the definition, benefits, conditions that should not be applied, and how to apply the foot massage.

Intervention

In the routine practices of the clinic, 3 × 1 paracetamol (acetominophen) tablet is prescribed to each mother by a doctor. The implementation and follow-up of the drugs are done by the nurse/midwives. Mothers demand these drugs as long as they have pain. To prove the effect of foot massage on pain, all mothers in the study and control groups were instructed by the researcher not to take analgesics as long as they can, to which they agreed.

Study group protocol

The first foot massage session was performed on each of the mothers in the study group by the researcher after mothers were taken to the postpartum service and after the effect of the initial analgesics had elapsed (4-6 hours after birth). Before the session, informed consent forms were signed, IIF, PCS, VAS (0 minutes) were completed by the mothers, and analgesics administered were recorded in a DFC.

The researcher prepared the mother for a foot massage, including foot care and proper positioning, and then performed a 20-minute foot massage session (10 minutes per foot). The VAS was repeated immediately after the first session (at the 20th minute) and after 30 minutes (at the 50th minute). The second session was performed the following day (20-24 hours after the first session and before the discharge). The VAS score was analyzed before the second session (at 0th minute) and repeated immediately after the foot massage (at the 20th minute) and 30 minutes (at the 50th minute). The PCS was also administered for the last time. Administered analgesics were recorded in the DFC. An information brochure complementing the foot massage application was provided.

Control group protocol

Like the mothers in the study group, the mothers in the control group were required to sign informed consent forms before participation. The control group completed the IFF, and the administered analgesics were recorded in the DFC after the mothers were taken to the postpartum service and the effect of the initial analgesics had elapsed (4-6 hours after birth). Routine procedures were applied, and the VAS was repeated in the same time frame as the study group mothers (0th, 20th, and 50th minutes) and after 20 to 24 hours but before discharge. At the same time intervals (0th, 20th, and 50th minutes), pain status was measured using the VAS, the PCS was administered for the last time, and analgesics administered were recorded on the DFC.

Foot massage

The foot massage included classical massage techniques such as effleurage, petrissage, and friction techniques. Effleurage is the movement of stroking and lubricating superficial tissues (Figure 2). It is performed at the beginning and end of the massage.[19,20] Petrissage is the slow and rhythmic

FIGURE 2. Effleurage.

movement while applying direct pressure to the soft tissue underlying the skin with the balls of the fingers and thumbs (Figure 3). Friction is the application of pressure through small circular movements only in small areas, using the hand or fingers (Figure 4). Since there is no reflexology technique in foot massage, relaxing massage techniques have been applied to the entire foot, not to certain pressure points. While muscle tissue is compressed and relaxed, blood and lymph circulation increases. Thus, the lactic acid level in the muscle fibers is diminished and fatigue and stress are decreased.[7,13]

Preparation for foot massage

Preparation of mothers

The foot was cleaned, washed, soaked in hot water for 10 minutes, and then dried. If there was no hot water, the foot was warmed for 10 minutes by wrapping it in a hot towel. The foot is positioned to ensure a comfortable position.

FIGURE 3. Petrissage.

FIGURE 4. Friction.

Preparation of the masseur (the researcher)

The masseur's nails are checked. Nails must not be long, and there cannot be any defects in his or her hands that may cause potential trauma.

Application time

The application time is 20 minutes (10 minutes for the left foot, 10 minutes for the right foot).[11,21,22]

Statistical analysis

The data gathered in the study were transferred to an electronic database and analyzed using SPSS 16. A research assistant from the Department of Biostatistics, Faculty of Medicine, Ege University, was consulted.

In the demographic information section, the number and percentage distributions of mothers were documented. To determine whether the independent variables showed similar distributions between the 2 groups, the chi-square/Fisher's exact test (sociodemographic and obstetric characteristics of mothers) was used. The Shapiro-Wilk test was performed to determine whether the data were suitable for normal distribution. For the comparison of mean scores of dependent variables between groups, the independent-samples *t* test and one-way analysis of variance were used.

RESULTS

The main characteristics (sociodemographic and obstetric) of the study and control groups are shown in

Tables 1 and 2, respectively. There was no significant difference between the study and control groups in terms of their sociodemographic and obstetric characteristics, and both groups were homogeneous ($P > .05$). The total PCS mean scores of the study and control groups are shown in Table 3. When the total scale scores were analyzed, the PCS mean score of the study group mothers was 118.21 ± 11.90 before the first foot massage and 136.45 ± 9.97 after the last foot massage. In contrast, the initial mean PCS score of the control group was 120.39 ± 13.56 and the final mean PCS score was 117.00 ± 14.40. While no statistically significant difference was found between the first PCS mean scores of the study group and the control group ($P = .490$), there was a statistically significant difference between the final PCS mean scores between the 2 groups ($P < .001$).

Comparisons of the severity and intensity of pain at the same duration before and after the first foot massage among mothers in the study and control groups are shown in Table 4. In the study group, the mean VAS score before foot massage (0th minute) was 5.02 ± 1.93 while it was 2.57 ± 1.73 at the 20th minute and 1.38 ± 1.23 at the 50th minute. The difference between the mean VAS score was statistically significant ($F = 168.736$, $P < .001$). However, no statistically significant difference was found among the mean VAS scores of the mothers in the control group ($F = 0.505$, $P = .606$).

Comparisons of the severity and intensity of pain at the same duration before and after the second foot massage among the mothers in the study and control groups are shown in Table 5. In the study group, while the mean VAS score before second foot massage (0th minute) was 4.06 ± 2.27, it was 1.90 ± 1.72 at the 20th minute and 1.02 ± 1.27 at the 50th minute. A statistically significant difference was found between repeated measures ($F = 120.595$, $P < .001$). A statistically significant difference was also noted between the mean VAS scores of the mothers in the control group ($F = 4.889$, $P = .011$). When compared with the study group, the difference was negligible.

A comparison of the number of analgesic drugs taken by the mothers in the study and control groups

TABLE 1. Investigation and Comparison of Sociodemographic Characteristics of Mothers in the Study and Control Groups

	Study Group (n = 33)		Control Group (n = 33)		Total (N = 66)	
Characteristics	**n**	**%**	**n**	**%**	**n**	**%**
Age group[a]						
18-23 y	16	48.48	23	69.70	39	59.09
24-35 y	17	51.52	10	30.30	27	40.91
			$\chi^2 = 3.071$, $P = .132$			
Education level						
Secondary school and below	23	69.70	26	78.79	49	74.24
High school and above	10	30.30	7	21.21	17	25.76
			$\chi^2 = 0.713$, $P = .398$			
Working status						
Working	5	15.15	4	12.12	9	13.64
Not working	28	84.85	29	87.88	57	86.36
			Fisher[b] $P = 1.000$			
Income status[c]						
The income less than expense	15	45.45	16	48.48	31	46.97
The income equal to expense	18	54.55	17	51.52	35	53.03
			$\chi^2 = 0.061$, $P = .805$			
Family type						
Small family	28	84.85	24	72.73	52	78.79
Large family	5	15.15	9	27.27	14	21.21
			$\chi^2 = 1.451$, $P = .367$			
Total	33	100	33	100	66	100

[a]The 24-29 and 30-35 age groups were united.
[b]Fisher's exact test was applied.
[c]"Income equal to expense" (study group: n = 16; control group: n = 16) and "Income more than expense" (study group: n = 2, control group: n = 1) groups were combined.

TABLE 2. Investigation and Comparison of Obstetric Characteristics of Mothers in the Study and Control Groups

	Study Group (n = 33)		Control Group (n = 33)		Total (N = 66)	
Characteristics	**n**	**%**	**n**	**%**	**n**	**%**
Planned pregnancy status						
Planned pregnancy	29	87.88	26	78.79	55	83.33
Unplanned pregnancy	4	12.12	7	21.21	11	16.67
			Fisher $P = .511$			
Length of stay in the maternity ward[a]						
≤12 h	25	75.76	24	72.73	49	74.24
>12 h	8	24.24	9	27.27	17	25.76
			$\chi^2 = 0.79$, $P = .100$			
Baby gender						
Girl	22	66.67	14	42.43	36	54.55
Boy	11	33.33	19	57.57	30	45.45
			$\chi^2 = 3.911$, $P = .083$			
Baby's birth weight						
2500-2999 g	10	30.30	13	39.40	23	34.85
3000-3499 g	14	42.43	14	42.42	28	42.42
3500-3999 g	9	27.27	6	18.18	15	22.73
			$\chi^2 = 0.991$, $P = .609$			
Laceration occurrence						
Occurred	10	30.30	6	18.18	16	24.24
Not occurred	23	69.70	27	81.81	50	75.76
			$\chi^2 = 1.320$, $P = .251$			
Degree of laceration[b]						
First degree	9	90.00	4	66.67	13	81.25
Second degree	1	10.00	2	33.33	3	18.75
			Fisher[c] $P = .518$			
Mothers satisfaction						
Satisfied	24	72.70	29	87.90	53	80.30
Not satisfied	9	27.30	4	12.10	13	19.70
			Fisher[c] $P = .215$			
Total	33	100	33	100	66	100

[a]"Less than 6 hours" and "Between 6 and 12 hours" are combined as "12 hours and less," and "Between 12 and 24 hours" and "24 hours and more" are combined as "More than 12 hours."
[b]Evaluated from the respondents.
[c]Fisher's exact test was applied.

TABLE 3. Investigation and Comparison of the First and Last Score Means of the Postpartum Comfort Scale of Mothers

	Study Group (n = 33)	Control Group (n = 33)	Between Groups[a]	
Postpartum Comfort Scale	$\bar{X} \pm$ **SD**	$\bar{X} \pm$ **SD**	***t***	***P***
Postpartum Comfort Scale first score means	118.21 ± 11.90	120.39 ± 13.56	−0.695	.490
Postpartum Comfort Scale last score means	136.45 ± 9.97	117.00 ± 14.60	6.322	<.001
Within group[b]	$t = -10.741$	$t = 3.158$		
	$P < .001$	$P = .003$		
	SD = 9.75	SD = 6.17		

[a]Comparison of mean scores of the Postpartum Comfort Scale between groups (*t* test in independent groups).
[b]Comparison of mean scores of the Postpartum Comfort Scale within the group (*t* test in dependent groups).

TABLE 4. Investigation of Pain Intensities of Study Group Mothers Before and After First Foot Massage and Comparison With Pain Severity of Control Group Mothers

Visual Analog Scale	Study Group (n = 33) $\bar{X} \pm$ SD	Control Group (n = 33) $\bar{X} \pm$ SD	*t* and *P*
0 min	5.02 ± 1.93	5.19 ± 2.06	$t = -0.352$ $P = .726$
20th min	2.57 ± 1.73	5.33 ± 2.07	$t = -5.863$ $P < .001$
50th min	1.38 ± 1.23	5.26 ± 2.15	$t = -9.018$ $P < .001$
Comparison within group[a]	$F = 168.736$ $P < .001$	$F = 0.505$ $P = .606$	

[a]Within-group comparisons were calculated using "repeated measures."

TABLE 5. Investigation of Pain Intensities of Study Group Mothers Before and After Last Foot Massage Application and Comparison With Pain Severity of Control Group Mothers

Visual Analog Scale	Study Group (n = 33) $\bar{X} \pm$ SD	Control Group (n = 33) $\bar{X} \pm$ SD	*t* and *P*
0 min	4.06 ± 2.27	4.93 ± 2.29	$t = -1.548$ $P = .127$
20th min	1.90 ± 1.72	4.75 ± 2.13	$t = -5.996$ $P < .001$
50th min	1.02 ± 1.27	4.56 ± 2.21	$t = -7.968$ $P < .001$
Comparison within group[a]	$F = 120.595$ $P < .001$	$F = 4.889$ $P = .011$	

[a]Within-group comparisons were calculated using "repeated measures."

is shown in Table 6. The number of analgesic drugs taken by the mothers in the study group until discharge was 1.15 ± 0.44. The number of analgesic drugs taken by the mothers in the control group was 2.61 ± 0.86. In terms of the number of drugs the mothers received, a statistically significant difference was evident between the 2 groups. The mothers in the study group received fewer analgesic drugs than those in the control group ($P < .001$).

DISCUSSION

In this study, mothers' reported pain was relieved, comfort levels were increased, and the need for analgesic medications was reduced to a minimum or was alleviated by the application of foot massages during their postpartum period. Mothers were kept in the hospital for 24 hours in the postpartum period after normal vaginal deliveries. During this period,

TABLE 6. Investigation and Comparison of Mothers' Drug Requirements

Characteristics	Study Group (n = 33)			Control Group (n = 33)			
	$\bar{X} \pm$ SD	Median, IQR	Min, Max	$\bar{X} \pm$ SD	Median, IQR	Min, Max	
Drug number[a]	1.15 ± 0.44	1.00, 0.00	0.00, 2.00	2.61 ± 0.86	3.00, 1.00	1.00, 5.00	$P < .001$ Mann-Whitney *U* test = 90.000

[a]The suitability of the data for normal distribution was evaluated by the Shapiro-Wilk test. Since the data were not suitable for normal distribution, the nonparametric method (Mann-Whitney *U* test) was applied.

routine procedures are performed and routine care is provided.

Effect of foot massage on postpartum comfort and pain

In the literature, the number of studies on comfort during the postpartum period is very limited.[23-26] In her master's thesis, Karakaplan[23] reported that 58% of mothers who had normal vaginal delivery stated that they received good care and 52% of them stated that the care they received in their postpartum period did not affect their comfort. This suggests that mothers find routine practices insufficient and that there is a need for additional practices to improve comfort and add value to routine practices.

Derya and Pasinlioğlu[25] investigated the effect of nursing care given to puerperants, who had cesarean delivery, on the postpartum comfort level based on the comfort theory and determined 27 nursing diagnoses. After the care that was provided in line with these nursing diagnoses, PCS Physical, Psychospiritual, and Sociocultural subscale scores of the mothers in the study group were found to be higher than those in the control group. In their study examining the effects of 20-minute cold gel application on the pain and comfort of the mothers having a vaginal delivery, Senol and Aslan[26] found that cold gel application was effective in relieving pain and increasing postpartum comfort level. Pinar et al[24] in their study found that among the people from whom the mothers wanted support during the postpartum period, medical staff ranked third with 26%, followed by their spouse and close relatives. When mothers' expectations from midwives and nurses were analyzed, only 37.6% of mothers who had normal birth did not have any expectations from midwives or nurses. Expectations include being supported, receiving information, being helped, relieving pain, baby care, and responding to their questions with information. In the same research, expectations such as being cared more, a smiling face, and psychological support were also primary concerns.

In our research, the application of foot massages might have been particularly effective in increasing the comfort of the mothers because the researcher is a midwife academician. It was the researcher herself who met the mothers' expectations by providing hands-on care with the application of foot massages, relieving their pain, answering their questions, and providing comfort during the massage, as well as ensuring that the baby is breastfeeding well.

Ramasamy and Hepzi[3] noted that 68% of mothers having normal vaginal delivery experienced 1 to 2 weeks of pain during their postpartum period and that determining the intensity of the pain is important for managing the pain efficiently. In their study, Xue et al[11] investigated the effect of foot massage after cesarean delivery. One of the parameters of their study was pain, and the intensity of pain decreased immediately and/or 60 minutes after the massage. In other studies in which a total of 20 minutes of hand and foot massages were performed to each extremity after cesarean delivery, and in which the effect of massage on pain was investigated, massages had a positive effect on pain.[7,12,13] Saatsaz et al[10] found that massages had a positive effect on pain in the control group, groups in which "only foot massage was performed," and in groups for which "both hand and foot massage were performed," but there was no significant difference between the groups; thus, it was determined that both practices have almost the same effect. In a study examining the effects of reflexology, which is the method that is closest to application of foot massage on pain of primiparous women, pain decreased immediately/or in 30, 60, and 120 minutes following 40 minutes of massage application.[27] Adib-Hajbaghery et al[28] suggested in their study that such therapies provide relaxation in the muscles, increase comfort level, and decrease pain. Similar results were noted by Fogarty et al.[29] In their study, Fogarty et al[29] found that massages applied during pregnancy and the postpartum period reduced stress and pain and improved sleep. Senol and Aslan[26] reported on the effects of applying cold gel for 20 minutes to the perineum of mothers who delivered vaginally, and it was found that the application of cold gel was effective in alleviating pain and consequently increased postpartum comfort levels. Bilgin and Komurcu[30] investigated the effect of uterine massage on women's perception of postpartum pain severity and documented that one group received "transabdominal circular fundus massage," another group received "transabdominal bimanual fundus massage," and the "control group" received only regular care; they also compared each group's pain intensities in the 1st, 2nd, and 6th hours. It was found that pain severity in the second-hour postpartum period in the group that received "transabdominal bimanual fundus massage" was less than that in the

other groups. In contrast, Can and Saruhan[31] found that compared with silicone massage and routine application, ice massage applied to pregnant women during labor was not effective for postpartum pain. As a result, it can be concluded that the techniques used to relieve mothers' pain in their postpartum period were generally effective. The results of our study concur with the results of these research studies.

Effect of foot massages on the need for analgesic medications

In this study, we investigated the effect of foot massages on the need for analgesic medications. In the hospital, where data were collected, 1 tablet of paracetamol is administered routinely every 6 to 8 hours in the postpartum period and held back until its effect has elapsed before giving a subsequent dose. The effect lasts for 4 hours on an average.[32] Considering the patient density and in accordance with the literature review, it was determined that 2 sessions of foot massage would be appropriate within 24 hours. In their study, published in 2012, Santos et al[32] stated that analgesics start to act 30 to 60 minutes after the application and the effect usually lasted for up to 4 hours. Considering the onset and duration of action of analgesic medications in our study, foot massage was started 4 to 6 hours after birth. The importance of not taking medications during their participation in this study was emphasized to the mothers in order to prove the effectiveness of foot massage and to conduct the research properly. However, medications were the mothers' first choice of pain relief when the effect of the foot massage elapsed.

The results of the study showed that the number of analgesic medications among the mothers in the study group was significantly lower than that of the mothers in the control group. Abbaspoor et al[7] investigated mothers' medication use and found that 15% of mothers in the massage group and 77.5% in the control group required analgesia and opioid intake up to 90 minutes after the massage. Hattan et al[33] in their study concluded that a single episode of massage is not as effective as regular massages.

In our study, analgesic drug intake was significantly reduced because of the efficacy of the foot massage for relieving pain in the postpartum period. However, it is important to perform and maintain foot massages at regular intervals so that the first method that mothers will apply in the presence of pain will not be pharmacological methods.

CONCLUSION

Midwives using different nonpharmacological methods have important roles in pain relief. Findings from this study confirmed that a foot massage performed by the midwife during the first 24 hours postpartum increased the mothers' comfort, decreased the severity of pain, and thus minimized the intake of analgesic medications. Therefore, it is important to support the continuity of nonpharmacological applications by midwives and nurses.

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