



The effects of reflexology on anxiety and pain in patients after abdominal hysterectomy: A randomised controlled trial

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ABSTRACT

Objectives: This study aimed at finding out the effects of reflexology on pain, anxiety levels after abdominal hysterectomy.

Design & methods: The study was performed on women hospitalized in the intensive care unit and gynecology services of Ege University Hospital in Izmir after abdominal hysterectomy between September 2013 and September 2014. This study was designed and conducted as a randomized controlled trial. The study sample consisted of 63 female patients: 32 in the experimental group and 31 in the control group. The postoperative daily monitoring sheet, Spielberger State Anxiety Inventory (SAI), was employed to collect research data and “visual analog scale” to evaluate pain levels.

Results: The female patients’ average age was found to be 47.23 ± 4.71 . The three-day monitoring showed a significant difference between the experimental and control groups in terms of average pain levels and anxiety scores after reflexology ($p < 0.05$).

Conclusion: Foot reflexology may serve as an effective nursing intervention to increase the well-being and decrease the pain of female patients after abdominal hysterectomy, and nurses should be aware of the benefits of reflexology.

1. Introduction

Hysterectomy is described as the surgical removal of uterus and is the most frequently performed surgical intervention after cesarean section. Although the rate of hysterectomy has decreased significantly worldwide, it is still one of the most commonly performed major gynecologic surgeries and is performed mostly in the reproductive ages.^{1,2,3} The most frequently observed complaints after hysterectomy are pain and fatigue, including the postoperative period.⁴ Touch and massage therapy have been used in pain treatment for centuries. Massage, integrated with pharmacologic treatment, has been found to be helpful in the treatment of acute postoperative pain.⁵

Touch therapy has always been a part of nursing care and now, reflexology has become another part of it.⁶ Reflexology, which is defined as a holistic healing technique, is an ancient art involving various techniques and philosophical approaches.^{7,8} The pictures in the Egyptian tombs show that foot massage was used as a treatment 5000 years ago.⁹ Reflexology is said to be introduced to the West only for around 90 years ago, although it has been long known in China and Egypt.¹⁰ The emergence of zone therapy was first described by Dr. William Fitzgerald, but Eunice Ingham is considered the mother of reflexology

who mapped the body on the foot. Development of reflexology technique has developed, for example using precision reflexology that involves holding discrete reflexes on the feet, vertical reflexology and meridian focused reflexology.^{11–13} Reflexology is not only a method based on stimulating the reflex points at the bottom of the foot but also similar to massage in that it manipulates soft tissue for therapeutic purposes. But also differs from massage in that it involves a more superficial contact and a deeper pressure on certain parts of the foot, and it resembles a caterpillar-like movement.^{14–16} The feet represent a microcosm of the body, all organs, glands and other body parts are laid out in a similar arrangement on the feet.¹⁷ In this way, It is believed that each part of the body is connected to a certain point at the bottom of the foot, and the pressure applied to these points will result in a relaxed and balanced body.¹⁸ Reflexology has also been reported to help relieve stress and tension, improve blood flow and promote homeostasis.¹⁵

Recent research findings demonstrate reflexology as a care alternative with a wider acceptance and popularity than yesterday.^{7,19} Studies also have confirmed the positive effects of reflexology, especially on postoperative pain.^{9,20,21} Randomized controlled studies by Tsay et al.¹⁴ evaluating the effects of reflexology on postoperative pain and anxiety in patients with stomach cancer and hepatocellular

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carcinoma demonstrated that the patients in the intervention group felt less pain and anxiety.⁹ An experimental research investigated the effects of hand reflexology on the levels of pain in postoperative abdominal surgery patients. The result of study, the mean pain score in post abdominal surgery patients after receiving true hand reflexology was significantly lower than after receiving mimic hand reflexology.²¹ Reflexology also has psychological benefits such as relaxation and improving the sense of well-being.⁶ Nurses, who are effective on pain qualified control after surgery, should also provide non-pharmacological pain relief to patients. Reflexology is a simple noninvasive method which has no complications and can be regarded as a part of nursing care in the critical care units.²² The present study aimed to determine the effects of foot reflexology on the postoperative pain and anxiety levels of patients who underwent abdominal hysterectomy; thereby contributing to the existing non-pharmacologic pain relief interventions used by nurses and providing a holistic qualified nurse care.

The research questions were as follows: –What are the effects of foot reflexology on pain and anxiety in patients who underwent abdominal hysterectomy as compared with a control group? –Is there any difference pain control interventions (patient-controlled analgesia treatment) between experimental and control groups after abdominal hysterectomy?

2. Methods

2.1. Design

This randomized controlled trial study aimed at exploring the effects of reflexology practice on pain, anxiety levels of the patients after abdominal hysterectomy. The study was conducted with the female patients treated in the intensive care units and gynecology services at Gynecology & Obstetrics Department of Ege University Hospital in İzmir after abdominal hysterectomy between September 2013 and September 2014.

Formal enrolment into the research was based on the following inclusion criteria: According to Rush-Medicus Patient Classification Criteria; independent patients or low-level dependent patients and Ramsey sedation score of the patient groups and those who volunteered to participate, have the literacy of reading and writing at least, undergone abdominal hysterectomy operation, reported post-operation pain of 3 or above according to Visual Analog Scale (The pain VAS is a unidimensional measure of pain intensity which has been widely used in diverse adult populations)²³, had not developed any complications at the early term post-operation were included in research. All groups consisted of benign hysterectomy patients whose operations was performed through general anesthesia. Exclusion criteria; who were oncology patients, developed many complications at the early term post-operation (severe bleeding, nausea vomiting, etc.), were not stable at post-operative vital signs (hypertension, tachycardia, hyperthermia, etc.), had history of chronic pain (like arthritis) and psychological problems. Exclusion criteria for the application group; who had disease on foot skin, local infection (apse etc.), open lesion/wound, scar tissue, oedema, hematoma, thrombophlebitis, deep venous thrombosis, lymphangitis, coagulation disorder, varicose veins, hepatitis, inflammatory and degenerative joint diseases, peripheral neuropathy, toe deformities, fracture, dislocation, muscle fiber, tendon or fascia injuries.

2.2. Sample

The study is a randomized controlled study. In this randomized controlled trial, 63 patients were randomized who met the inclusion criteria appropriately. Participants were randomized using a computer-program to receive either experimental or control groups. The study sample consisted of 63 patients: 32 of the patients were in the experimental group and 31 of them were in the control group (see Fig. 1).

The study sample size was calculated using the results of the pre-

intervention. According to the results from the pre-intervention, a significant difference was found in pain and anxiety levels before and after reflexology on the pre-intervention analyses performed by a statistics expert on the postoperative first, second and third days. The power analysis that was calculated by using Gpower 3.1.3 program confirmed that a power of higher than 80%, an effect size of 0.55, $\alpha = 0.05$, $\beta = 0.20$ and 2-sided statistical tests should be achieved with 56 patients in experimental and control groups for the statistical significance of the result.

2.3. Measures

Data were collected using a patient identification form, a post-operative daily monitoring form and the Spielberger's State-Trait Anxiety Inventory (SAI). Visual Analog Scale (VAS) was used to evaluate pain.

2.4. State anxiety inventory

STAI is a self-evaluation questionnaire that includes short expressions. This scale was initially developed to inspect anxiety in healthy adults and was then approved by subsequent trials for upper secondary school students and individuals with psychiatric and physical disorders. Spielberger et al. tested the reliability of the original form in three dimensions. The scale was adapted and standardized into Turkish by Oner and Le Compte in 1974–1977. In State Anxiety Inventory (SAI), individuals need to define how they feel at a specific moment or under certain circumstances and express their feelings considering the current situation. For this reason, the “State Anxiety Inventory” a part of STAI was used to evaluate the anxiety of the patient at that time in our study. Feelings or behaviors expressed in SAI items were provided with options of “1 = none”, “2 = a little,” “3 = pretty much,” and “4 = completely,” according to the severity of the experience. The highest and lowest were 80 and 20, respectively. The higher the total anxiety score is, the more the anxiety level of the individual is.^{24,25}

2.5. Visual analog scale (VAS)

VAS was used to evaluate pain levels. It is a 10-cm horizontal or vertical line, ranging from “No Pain” to “Intolerable Pain.” The patients were asked to mark the number that reflected their pain severity, where ‘0’ indicated the absence of pain and ‘10’ indicated the presence of very severe pain. The vertical line is assumed to be easier to understand in general.^{16,27} The Cronbach's α internal consistency coefficient was found to be 0.85 for the pain subscale.

2.6. Clinical interventions

The written consent of the female patients was obtained after the researcher informed them about the procedures on the day before the operation and patient identification form was completed for each patient volunteered to participate. All patients were informed on the use of patient-controlled analgesia (PCA) device and VAS during the pre-operative visits.

When each participant was informed about the requirements of the study and agreed to attend by signing a consent form, the participants were allocated into the experimental and control groups. After having their written consent, potential participants were pair-matched, then randomly assigned one of two women from a matched pair to the experimental group or the control group. Individuals in experimental and control groups were taken in different time in order to prevent interaction among them since they will share the same room. A group was not selected on one day belonging to the other group.

In the intensive care unit, the patients were administered, and as a standard, analgesia intravenous morphine infusion via the PCA device. Therefore, PCA was standardized for a bolus dose of 0.02 mg/kg after a

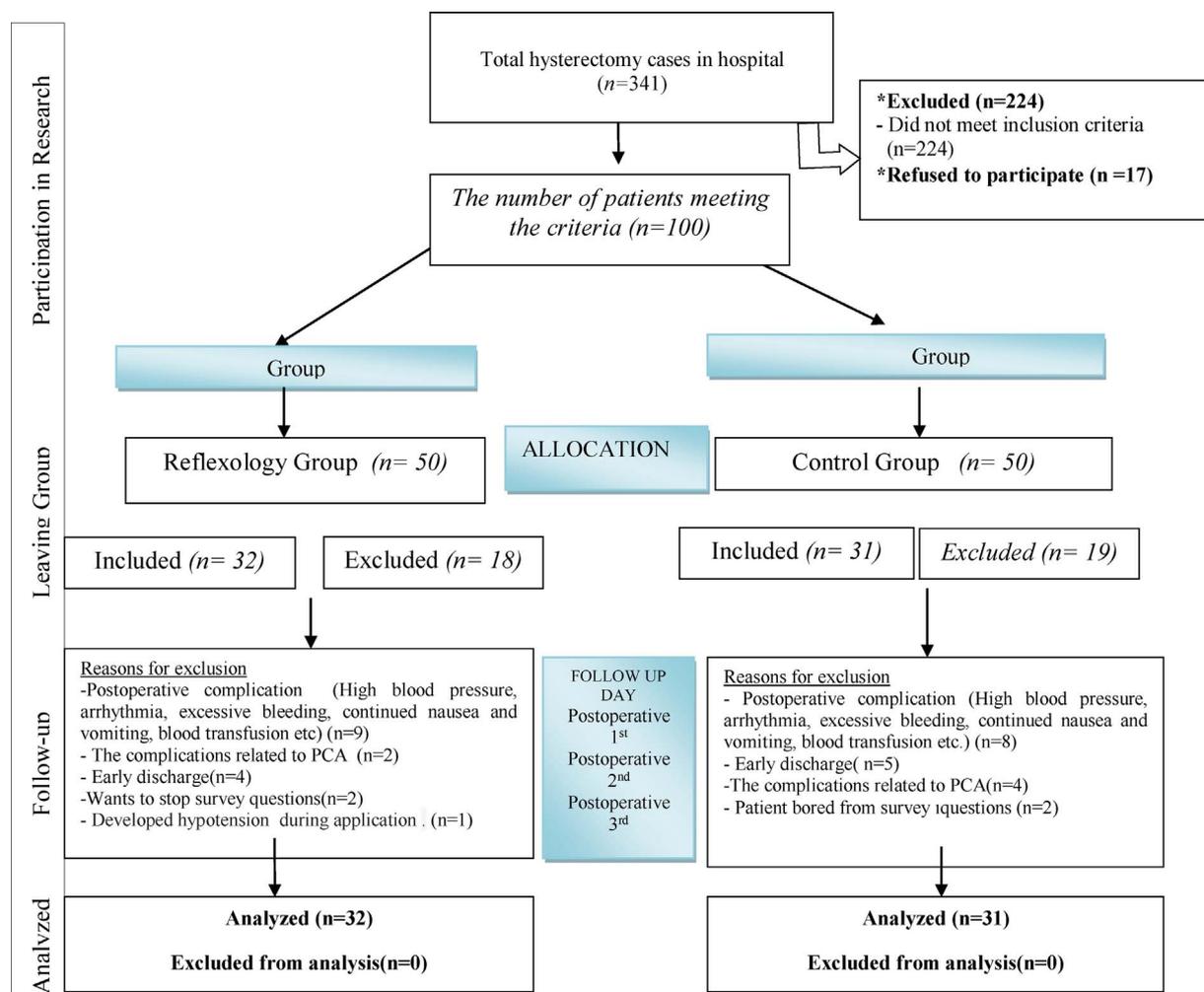


Fig. 1. CONSORT flow diagram.

loading dose of 0.05 mg/kg, a 15-min lock-out (lock-out time), and a 20-mg 4-h limit. While the patients in the control group received only analgesic treatment after surgery, the patients in the experimental group received foot reflexology along with analgesic treatment.

The application of reflexology was performed by the researcher herself. After reflexology practice, the patients were left alone and were asked to complete the questionnaire and scales by their own and put it in closed envelope. Reflexology was administered on the postoperative first, second and third days. Pain levels, anxiety levels were evaluated before (0-min), immediately after (30-min) and half an hour after (60-min) reflexology. The values obtained were recorded on the Postoperative Daily Monitoring Form before (0-min), immediately after (30-min) and half an hour after (60-min) reflexology. The control group received only analgesic treatment and routine nursing care after the surgery, without any intervention.

Reflexology was administered to all patients by one researcher who had received theoretical and practical training and was certified by two reflexologists before the study. Reflexology was applied to both feet for 20 min (each foot 10 min). It is recommended that each session be performed within 10 min–45 min in the literature.^{28,29} There is no specific evidence of how long the application of reflexology should last. The duration of reflexology varies according to the reflex area and patient group. For this reason, the study was conducted at the optimal time, considering the early postoperative period and the presence of other complications. Similarly, there are some studies which practice reflexology sessions during 20 min^{9,30} Unscented olive oil was applied as a lubricant for the massage. The Ingham method was used on the

entire soles of the feet to stimulate the whole body, increase the blood flow and relaxation, and eliminate waste materials.⁸ The researcher began the massage by applying their palm to the outer edge of the foot, moving it back and forth.³¹ During the intervention, the therapist first used her thumbs and forefingers to press and massage each reflex zone twice.⁹ In the study were administered for relaxing techniques at the beginning and the end of the session. In line with the study, during the remaining time cardiovascular, respiratory, endocrine and reproduction systems, hypophysis, thyroid, parathyroid, pancreas, adrenal gland and solar plexus points were studied. The techniques used during the intervention were thumb pressing, finger pressing, finger roll, rubbing, thumb walking caterpillar type movement, and kneading.^{26,32,33}

2.7. Research data analysis and evaluation techniques

Data were analyzed by using the SPSS 15.0 software. While categorical measurements were indicated in numbers and percentage, numerical measurements were indicated in average and standard deviation. Pearson's chi-square and Fisher's exact tests were used to compare the categorical measurements of both groups. Numerical measurements were analyzed by using Kolmogorov–Smirnov test to determine whether normal distribution assumption was met or not. The *t* test (Student's *t* test) and Mann–Whitney *U* test were used to compare the two time periods for numerical measurements in the independent groups. In the dependent groups during comparison of digital measurements, as a result of normal dispersion of Spielberger's State Anxiety Inventory, experimental and control groups' before reflexology

(0-min), immediately after reflexology (30-min), and half an hour after reflexology (60-min), intragroup measurements were compared at day 1, 2 and 3; “Variance analysis for repeated Measurements” (rAnova) was used and Bonferroni correction *t*-test (paired samples *t*-test) was used in order to determine which measurements the difference resulted from. Since pain and contentment levels are dispersed normally and because there is an ordinal data evaluated with VAS, before reflexology (0-min), after reflexology (30-min and 60-min) comparison of intragroup measurements at day 1, 2 and 3 the “Friedman Variance Analysis” and in order to determine which measurements the difference resulted from Bonferroni corrected Wilcoxon signed-rank test were used.

2.8. Ethical consideration

The approvals of Ege University Clinical Researches Ethics Committee and Ege University Gynecology and Obstetrics Department were obtained to conduct the study. The written consents of the female patients were obtained after the researcher informed them on the objective of the study.

3. Results

3.1. Descriptive statistics

The female patients’ average age was 47.23 ± 4.71 (min: 37, max: 57) years. All participants, 34.9% were secondary/upper secondary school graduates, 77.8% were married, 71.4% were not working, and 60.3% had one or two children. Table 1 below demonstrates that there was no statistically meaningful difference between the socio-demographic characteristics of the experimental and control groups in the

chi-square analyses carried out to determine the homogeneity of the groups. A total of 63 patients, 55.6% were diagnosed with fibroids+menorrhagia, and 14.3% were diagnosed with adnexal mass, 81.0%, received TAH + BSO (Table 1).

3.2. Results for pain

The average pain score of the experimental group was statistically lower than that of the control group at 30 and 60 min (after reflexology) on each of these 3 days ($p < 0.05$) (Table 2). A significant difference was found between pain score averages on the postoperative first, second and third days when reflexology was administered to the patients in the experimental group ($p < 0.05$) (Table 2). Also, the total analgesic amount in the control group was found to be significantly higher than the experimental group in first day ($U = 317.000$, $p = 0.032$), ($U = 294.500$, $p = 0.006$) (Table 4).

3.3. Results for spielberger state anxiety inventory

Comparison of the changes in anxiety, between the experimental and control groups showed a statistically significant improvement in each of the 3 days. Average of the state anxiety score of the experimental group significantly reduced compared to that of the control group after reflexology in 30 and 60 min ($p < 0.05$) (Table 3).

4. Discussion

Most individuals have difficulty in coping with the postoperative pain.³⁴ One of the major challenges today is to decrease the pain.³⁵ Although they are essential for postoperative pain management, analgesics may not always sufficiently relieve the pain. Reports find the

Table 1
Distribution of study participants based on their sociodemographic and individual characteristics.

Variable	Experimental (n = 32)		Control (n = 31)		Total (n = 63)		x ² /p
	n	%	n	%	n	%	
Age							
37–43 years	6	18.8	5	16.1	11	17.5	x ² = 0.08 p = 0.963 > 0.05
44–50 years	18	56.2	18	58.1	36	57.1	
51–57 years	8	25.0	8	25.8	16	25.4	
Educational Status							
Literate	6	18.8	1	3.2	7	11.1	x ² = 4.33 p = 0.228 > 0.05
Primary school	9	28.1	8	25.8	17	27.0	
Secondary/HighSchool	10	31.2	12	38.7	22	34.9	
University/College	7	21.9	10	32.3	17	27.0	
Working Conditions							
Unemployed	25	78.1	20	64.5	45	71.4	x ² = 1.43 p = 0.232 > 0.05
Employee	7	21.9	11	35.5	18	28.6	
Marital Status							
Married	25	78.1	24	77.4	49	77.8	x ² = 0.05 p = 0.946 > 0.05
Single/Divorced	7	21.9	7	22.6	14	22.2	
Child Ownership							
Have no child	5	15.6	10	32.3	15	23.8	x ² = 5.25 p = 0.072 > 0.05
1 or 2 children	19	59.4	19	61.3	38	60.3	
3 or 4 children	8	25.0	2	6.4	10	15.9	
Diagnoses							
Fibroids + menorrhagia	19	59.4	16	51.6	35	55.6	
Hyperplasia	5	15.6	3	9.7	8	12.7	
Pelvic Pain	4	12.5	1	3.2	5	7.9	
PMVK	2	6.3	4	12.9	6	9.5	
Adnexal mass	2	6.3	7	22.6	9	14.3	
Type of Operation							
ATH	4	12.5	4	12.9	8	12.7	
ATH + BSO	26	81.3	25	80.6	51	81.0	
ATH + USO	2	6.2	2	6.5	4	6.3	

*Pearson’s chi-square and Fisher’s exact tests.

Table 2
Distribution of pain point averages of experimental and control groups by day and time of measurement.

DAY/TIME	DAY 1				DAY 2				DAY 3			
	Experimental (n = 32) X ± SD	Control (n = 31) X ± SD	U***	P****	Experimental (n = 32) X ± SD	Control (n = 31) X ± SD	U	P	Experimental (n = 32) X ± SD	Control (n = 31) X ± SD	U	P
PAIN												
0 min (BR)*****	7.53 ± 1.96	6.38 ± 1.33	348,000	0.400	5.76 ± 1.80	4.51 ± 1.65	30,100	0.007	4.28 ± 1.95	3.50 ± 1.49	38,500	0.122
30 min (IAR)	5.56 ± 1.99	7.25 ± 1.82	266,500	0.001	3.59 ± 1.91	4.59 ± 1.81	33,800	0.027	2.46 ± 1.41	4.01 ± 2.02	25,700	0.001
60 min (HHAR)	4.78 ± 1.91	7.45 ± 1.82	163,500	< 0.001	3.03 ± 1.59	5.10 ± 1.92	21,150	< 0.001	2.25 ± 1.27	4.00 ± 2.19	23,950	< 0.001
P**	χ ² = 58.11; P < 0.001	χ ² = 45.02; P < 0.001			χ ² = 54.56; P < 0.001	χ ² = 25.63; P < 0.001			χ ² = 47.34; P < 0.001	χ ² = 20.49; P < 0.001		

*χ² = The Friedman test is the non-parametric alternative to ANOVA with repeated measures, **p = Significant intragroup differences related to the Friedman Test.
U = Mann–Whitney U test were used to for the comparison of each two time periods in two groups *p = Significant differences between the experimental and control groups.
*****BR = Before Reflexology.
IAR = Immediately after reflexology.
HHAR = Half hour after reflexology.

administration to be insufficient, although new drugs and methods for postoperative pain control have been acquired in 20 years. Besides, analgesics have a few undesired side effects.^{36,37} Therefore complementary therapy and interventions becomes more important and needed, as a non-pharmacological pain management has the potential to palliate acute postoperative pain.^{7,38}

In this study, the postoperative pain score averages of the experimental group decreased with reflexology intervention for each of the 3 days, although the patients in this group were more agitated with higher initial pain score averages. The total analgesic amount in the control group was found to be significantly higher than the experimental group (p < 0.05). In particular, the total amount of analgesics taken with PCA is less in the experimental group, it is very important because it is an objective data that shows the effect of the reflexology in the study. Various clinical studies have shown reflexology to be a supportive method in postoperative pain control.^{9,15,32} Tsay et al.¹⁴ found in their randomized controlled studies that evaluated the effects of reflexology on postoperative pain and anxiety in patients with stomach cancer and hepatocellular cancer that the pain level of the patients in the intervention group reduced over time; also, they had a lower intake of analgesics. They stated that reflexology should be regarded as a nursing intervention to be applied to cancer patients in the postoperative period.⁹ Sadeghi Shermeh found a significant decrease in postoperative pain intensity of the experimental group compared to that of the control group in his quasi-experimental study conducted with patients with sternotomy after coronary artery bypass graft surgery. Foot reflex massage was stated to be beneficial in reducing pain after coronary artery bypass graft surgery.²⁰ Park et al. found that the reflexology administered to patients with breast cancer surgery

Table 4
Comparison of the difference between total postoperative analgesia amounts of women in the experimental and control groups.

Total Analgesic (Morphine) Amount (Mg) by Patient Controlled Analgesia				
DAY/TIME	Experimental (n = 32)	Control (n = 31)	U*	P
0 min 0 (BR)	6.97 ± 3.47	7.74 ± 2.41	414.000	0.137
30 min (IAR)	7.28 ± 3.67	8.50 ± 2.31	388.000	0.102
60 min (HHAR)	9.19 ± 3.64	11.27 ± 2.48	317.000	0.032
24 h Total Dose	16.68 ± 3.84	19.27 ± 3.13	294.500	0.006

*Mann Whitney U test was performed in independent groups.

positively affected the pain levels perceived by patients and also treatment at 6 h and 24 h after surgery reduced pain intensity.³⁹ Another study, found that there was a 50% reduced use of analgesics in the experimental group against the control group.⁴⁰ These results support the findings of the literature that show the positive effects of foot reflexology on postoperative pain after hysterectomy and can decrease analgesic intake.

Most of the female patients who undergo a surgical intervention have clinical anxiety.⁴¹ Uterus is the symbol of reproduction, and female patients who underwent hysterectomy may feel depressed considering themselves as if they “were not women anymore” or “lost their femininity”.^{42,43} Foot nerve stimulation results in relaxation, relieves strain and helps regaining body balance, and therefore, it is effective in reducing anxiety levels.⁴⁴ In the present study, a significant decrease was found in the state anxiety score averages of the control group in only one measurement; no significant difference was observed in the other measurements. State anxiety score averages of the experimental

Table 3
Comparison in terms of Spielberger’s state anxiety inventory for women in experimental and control groups.

DAY/TIME	DAY 1				DAY 2				DAY 3			
	Experimental (n = 32) X ± SD	Control (n = 31) X ± SD	t***	P****	Experimental (n = 32) X ± SD	Control (n = 31) X ± SD	T	P	Experimental (n = 32) X ± SD	Control (n = 31) X ± SD	t	P
State-Trait Anxiety												
0 min 0 (BR)*****	58.87 ± 4.81	57.32 ± 4.81	1.59	0.118	57.90 ± 3.92	56.48 ± 3.59	5.03	0.138	56.50 ± 3.68	55.16 ± 2.93	-1.59	0.116
30 min (IAR)	52.31 ± 4.81	59.80 ± 3.10	-7.32	< 0.001	50.34 ± 5.05	57.09 ± 4.03	-5.06	< 0.001	49.06 ± 4.59	56.90 ± 3.77	-7.41	< 0.001
60 min (HHAR)	49.46 ± 4.04	60.09 ± 3.70	-10.88	< 0.001	46.50 ± 4.61	56.77 ± 4.18	-9.02	< 0.001	45.75 ± 4.25	55.96 ± 3.85	-9.99	< 0.001
P**	*F = 23,921; P < 0.001	F = 5,574; P < 0.001			F = 44,423; P < 0.001	F = 385; P < 0.033			F = 27,969; P < 0.001	F = 19,22; P < 0.001		

*F = Repeated measures ANOVA **p = Significant intragroup differences related to ANOVA ***t = t test in independent groups (Student’s t-test) were used to for the comparison of each two time periods in two groups ****p = Significant differences between the experimental and control groups.

group significantly decreased compared to that of the control group after intervention on each of the 3 days ($p < 0.05$) (Table 2). In their study conducted with 80 patients with coronary artery bypass graft Nesami et al. found a significant decrease in anxiety after foot reflexology massage.³¹ This research concurs with previous findings that touch and reflexology can be effective for managing and decreasing anxiety significantly in surgical patients.^{27,31,45}

4.1. Conclusion and recommendations

It has been found that foot reflexology reduces pain, anxiety after abdominal hysterectomy and that this difference is statistically significant ($p < 0.05$). The result also showed a significant reduction of requirement of pain killers. Therefore, applying reflexology can be an easy, cheap, effective nursing intervention, and non-invasive method for postoperative pain management after abdominal hysterectomy. Thus, awareness should be raised among all health care staff, particularly nurses, and regular in-service training should be provided. There is a need for larger scale RCT to pass reflexology as clinical nursing practice, but it is thought that this study is important for awareness and stepping. For this purpose, all future studies should be repeated with larger populations and longer monitoring periods and research results should be reflected on the clinical practices.

4.2. The limitations of the study

This study has potential limitations, each of which indicates directions for future study. The applications were carried out by the researcher himself. It was not possible to blind the researchers and participants to group division due to nature of the practice. However, the data collection forms were responded by the participants themselves by using self-reported measures. In this way, the bias has been avoided.

The study only reflects the observations in the clinical process; the long-term effects after being discharged from the hospital could not be observed. In our study, the control group received routine treatment while reflexology group patients received routine treatment and foot reflexology. These positive findings based on reflexology are likely to be a result of the relationship between the patient and the reflexologist, rather than the effect of the interventions. That reason, in future studies, it would be useful to compare the specific effect of reflexology with the placebo group. And also reflexology is evaluated only after hysterectomy, larger RCT studies are needed to generalize the results. At the same time, it is suggested that these unique women undergoing gender-associated trauma, who have hysterectomy operation, should also include a qualitative assessment of their narrations.

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