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The Effect of Foot Reflexology on Pain, Anxiety and Mobility in Patients with Knee Arthroplasty

Diz Artroplastisi Yapılan Hastalarda Ayak Refleksolojisinin Ağrı, Anksiyete ve Hareketlilik Üzerine Etkisi

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ABSTRACT

Objective: The aim of this study was to examine the effect of foot reflexology on pain, anxiety and mobility in patients with knee arthroplasty.
Methods: The research was conducted as a control group experimental study. The study included 100 patients (50 patients in the experimental group and 50 patients in the control group). Patient Information Form, VAS Pain Form, BECK Anxiety Scale, Patient Mobility Scale, Observer Mobility Scale, Patient Mobilization Questionnaire were used to collect data from the participants.
Results: It was determined that the mean pain levels of the patients in the experimental group before and after the application on days 0,1 and 2 decreased and this difference was statistically significant (*P*< .05). It was determined that the mean pain scores of the patients in the control group on days 0,1 and 2 decreased and the difference between the mean pain scores on day 0 and day 1 was statistically significant (*P*< .05). The anxiety averages of the patients in the experimental group on day 0, day 1 and day 2 after reflexology application were significantly lower than the control group (*P*< .05). It was determined that the patients' mobility and mobilization numbers increased significantly with foot reflexology (*P*< .05).

Conclusion: The results of the study showed a decrease in the pain and anxiety levels and an increase in the number of mobilizations in the experimental group when compared to the control group. The notable reduction in pain and anxiety in the experimental group after receiving foot reflexology massage suggests that this complementary therapy is an effective complementary therapy for reducing both anxiety and pain.

Keywords: Anxiety, nursing care, pain, reflexology

ÖZ

Amaç: Bu çalışma, diz artroplastisi yapılan hastalarda ayak refleksolojisinin ağrı, anksiyete ve hareketlilik üzerine etkisini incelemek amacıyla yapılmıştır.
Yöntemler: Araştırma kontrol gruplu deneysel çalışma olarak yürütülmüştür. Çalışmaya 100 hasta (deney grubunda 50 hasta ve kontrol grubunda 50 hasta) dahil edilmiştir. Verilerin toplanmasında hasta tanıtım formu, VAS Ağrı Formu, BECK Anksiyete Ölçeği, Hasta Hareketlilik Ölçeği, Gözlemci Hareketlilik Ölçeği, hasta mobilizasyon soru formu kullanılmıştır.
Bulgular: Deney grubundaki hastaların 0.gün, 1. gün ve 2. gün uygulama öncesi ve sonrası ağrı ortalamalarının azaldığı ve bu farkın istatistiksel olarak anlamlı olduğu saptanmıştır (*P*<,05). Kontrol grubundaki hastaların ise 0.gün, 1.gün ve 2.gün ağrı ortalamasının azaldığı ve 0. ve 1. gün ağrı ortalamaları arasındaki farkın istatistiksel olarak anlamlı olduğu belirlenmiştir (*P*<,05). Deney grubundaki hastaların refleksoloji uygulamasından sonra 0. gün, 1. gün, 2. gün anksiyete ortalamaları kontrol grubuna göre anlamlı derecede daha düşüktür (*P*<,05). Ayak refleksolojisi ile hastaların hareketlilik ve mobilizasyon sayılarının anlamlı derecede arttığı saptanmıştır (*P*<,05).
Sonuç: Bu sonuçlar doğrultusunda deney grubunda kontrol grubuna göre ağrı ve anksiyete düzeylerinde azalma, mobilizasyon sayısında ise artış olduğu saptanmıştır. Deney grubunda ayak refleksolojisi uygulandıktan sonra ağrı ve anksiyetede belirgin bir azalmanın olması, bu tamamlayıcı tedavinin hem ağrıyı hem de anksiyeteyi azaltmada etkili bir yöntem olduğunu göstermektedir.

Anahtar Kelimeler: Anksiyete, hemşirelik bakımı, ağrı, refleksoloji

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INTRODUCTION

Total knee arthroplasty (TKA) surgery is a procedure that produces positive results in the treatment of pain caused by osteoarthritis, which is characterized by deterioration, wear and tear in the joint cartilage of the knee joint, which is a frequently performed orthopaedic procedure.[1] The general purpose of TKA surgeries is to correct deformities, regain the function of the knee joint and relieve long-term pain.[2] TKA is a major surgery that requires a physical, psychological and social preparation of the patients and therefore nurses should plan the patient care by evaluating the patient holistically in the preoperative period.[3,4]

The goal of TKA is to eliminate pain, restore function with increasing movements, improve the deformity, and ultimately improve both the psychological and physical quality of life of the patient.[1,4,5] Acute pain that is one of the most important complaints of the patients in the postoperative period begins with surgical trauma and decreases over time.[2,6,7] However, the postoperative pain caused by TKA, which is known as one of the most painful surgical methods, disrupts the comfort of the patient and causes delay in mobilization and rehabilitation.[8,9] Especially in patients with orthopedics and traumatology and thus the pain that cannot be relieved leads to an increase in the patient's anxiety level.[10] In this context, effective pain and anxiety control can be achieved by active use of nursing process by means of providing individualized patient care to patients with postoperative pain and anxiety. In order to reduce the pain and anxiety levels of patients in the postoperative period, non-pharmacological methods (imagination, music therapy, distraction, reflexology) as well as pharmacological treatments (analgesics, anti-inflammatory) are used.[6,8,11-13] Reflexology, one of the complementary treatment methods, can be applied to reduce anxiety, fatigue and tension, regulate the functioning of the sympathetic and parasympathetic systems, and relieve joint pain, depression, anxiety, migraine, headaches, constipation, indigestion, some urinary system problems, and nausea and vomiting.[14,15] When the literature was examined, it was determined that as a result of reflexology applied for an average of 30 minutes, the level of pain and anxiety of the patients decreased in the early period.[15-17] There is no study in the literature on the application of reflexology, one of the methods used by nurses to reduce pain and anxiety, to orthopedic patients.

AIM

The aim of this study was to examine the effect of foot reflexology on pain, anxiety and mobility in patients undergoing knee arthroplasty. It is thought that the results obtained from the study will guide the management of pain, anxiety and mobilization, which is an important problem for orthopedics and traumatology nurses.

Research questions/hypothesis

$H_{1.1}$: Foot reflexology is effective in reducing pain in patients with knee arthroplasty.

$H_{1.2}$: Foot reflexology is effective in reducing anxiety in patients with knee arthroplasty.

$H_{1.3}$: Foot reflexology is effective in increasing mobility in patients with knee arthroplasty.

METHODS

Study Design and Sample

An experimental study was conducted to determine the effect of foot reflexology on pain and anxiety in patients with total knee arthroplasty. The population of the study included patients who have been admitted to orthopedics and traumatology clinic at a training and research hospital between 09.10.2017 and 23.02.2018 and were subjected to TKA. The sampling included patients who have experienced total knee arthroplasty for the first time, 18-year-old or older, and had not previously received foot reflexology therapy. These patients also must not suffer from any cognitive, affective and verbal communication problems that would prevent the understanding of the given information and the ability to express pain, anxiety, and verbal communication accurately. Besides, these patients must have no complications (fever, infection, etc.) before, during and after 3 days. The sample size was calculated by using a G*Power 3.1 packet program in the study.[18] As a result of the power analysis, it was determined that a total of 100 patients were included in the experimental and control groups at a level of $\alpha = 0.05$ and 90% power, 95% confidence interval. During the study period, a total of 203 patients underwent total knee replacement surgery. 85 patients were excluded from the study because they were operated on by different physicians and 10 patients were excluded because they had revision surgery. The study sample was determined by block randomization to include the experimental or control groups. Patients who had surgery one week were included in the experimental group, and those who had surgery the following week were included in the control group. Patients in the experimental and control groups were randomized according to gender and included in the groups. For this reason, 8 female patients were not included in the study. In order to avoid bias in the study results, data regarding pain, anxiety and mobility after reflexology application were evaluated by another nurse, independent of the researcher.

Data Collection Tools

Data were collected using the patient identification form, visual analogue scale (VAS) pain form, BECK anxiety scale, patient mobility scale, observer mobility scale, and patient mobilization questionnaire.

Patient Information Form: It was prepared by the researchers based on the literature.[9-11,13,16,19] In this form, there are 7 questions about the patient's personal information (age, sex, educational status, marital status), the patient's place of residence, chronic illness, and hospitalization procedures.

Visual Analogue Scale (VAS) Pain Form: In this study, the pain level, the most intense pain level during the day, and the level of pain during mobilization were examined by means of a visual analogue scale. VAS is a measurement tool that is frequently used to convert data that cannot be quantified. The patients were asked to mark their pain on a 100 mm line.[20]

BECK Anxiety Scale: The scale was developed by Beck et al. in 1988 to separate anxiety from depression and to evaluate the severity of the anxiety symptoms. The scale consists of 21 items that examine the anxiety symptoms and it is scored on a Likert-type scale of 0-3. The high scores of the scale indicate the severity of the anxiety. The validity and reliability of the scale for Turkey in 1998 was carried out by Ulusoy et al. The Cronbach's alpha internal consistency score of the scale was 0.93[21], and the internal consistency value calculated for the whole scale was found to be 0.82 from the data obtained within the scope of this study.

Patient Mobility Scale: The Patient Mobility Scale was developed by Heye et al. in 2002. In the scale, 4 activities were performed after surgery and experiencing pain and the difficulty level of movement under each activity are evaluated. The increased score indicates increased pain and a difficulty with respect to the activity. The Turkish validity-reliability study of the Patient Mobility Scale was conducted by Ayoğlu (2011) on general surgery patients, and the internal consistency value of Cronbach alpha was determined as 0.90.[22] In this study, Cronbach alpha value was found to be 0.76.

Observer Mobility Scale: The scale was developed by Heye et al. in 2002. During the four physical activities specified in the patient mobility scale after the patient's surgical procedure, the dependence- independence status / grade was scored between 1-5 by an observer. The total score of the scale was obtained by summing the scores related to four activities. The total scores taken from the scale were between 4-20, whereby the high scale scores indicate an inadequate mobility of the patients. The Turkish validity-reliability study of the Observer Mobility Scale was conducted by Ayoğlu (2011) and the internal consistency value of Cronbach alpha was found to be 0.73.[22] In this study, the internal consistency value calculated for the whole scale was found to be 0.65.

Patient Mobilization Questionnaire: In this form, the patient's postoperative standing time, the desire to stand up due to pain on the foot (0-10 visual analogue scale), the number of mobilizations during the day and the pain level during mobilization were evaluated.

Protocol: All patients were operated by the same physician under the spinal anesthesia. As a standard protocol for pain control of patients, the patient-controlled analgesia (5 ampoules pethidine hydrochloride, 0.9% NaCl in 100 ml) was used for the first 24 hours after surgery. In addition, 3×100 mg paracetamol infusion and 2×75 mg diclofenac sodium intramuscular administration were administered during the daily hospitalization. No analgesic application was made to the patients participating in the study other than the treatment protocol. The patients were not mobilized for the first 24 hours after surgery. The researchers received the diploma of Expert Reflexologist from the International Institute of Reflexology (Document date: 30.05.2017, Document No: 2017/3005, Issue: 0.096.191).

Application of the Research

Pain, anxiety, patient mobility scale, and observer mobility scales were collected by a nurse other than the researcher in order to avoid any bias and to make blind evaluations. When the effect of the spinal anesthesia on the day of the operation exceeded, the first interview was given to the patients in both experimental and control groups and the part of the data collection form regarding the patient introduction was completed after obtaining the consent of the patient.

Afterwards, in the experimental group, the first reflexology application (6 hours after surgery) was performed. Before reflexology application, VAS pain scale was applied to the patients. In the reflexology application, the right foot decreases the activation of the sympathetic nervous system and the left foot activates the parasympathetic nervous system, thus affecting the patient's pain and anxiety levels. For this reason, 20 minutes to the right foot and 10 minutes to the left foot were applied for a total of 30 minutes. The first 5 minutes of the session was dedicated to warming, loosening, and getting ready for the massage, while the remaining time was devoted to stimulating the reflex points related to pain and anxiety. The termination of the massage was achieved by repeating

the relaxation exercises. After application, the patient was administered to a VAS pain scale with questions about pain, and then the BECK anxiety scale was administered. After 24 hours application, the patient was re-interviewed, and the reflexology was performed again. VAS pain scale was applied before and after each reflexology application. After the application, the BECK anxiety scale were applied, and then the patient was mobilized, whereby the Patient Mobility Scale, the Observer Mobility Scale, and the mobilization questionnaire were applied. The application was repeated on the 2nd day of surgery. The reflexology sessions were applied to the experimental group patients once every 24 hours for 3 days.

The first interview was conducted with the patients in the control group at the 6th postoperative hour, whereby prior information was given about the research, and after obtaining the consent, the part of the data collection form regarding the patient presentation was completed. Then, a VAS pain scale and the BECK anxiety scales were applied by a nurse other than the researchers. After 24 hours, the VAS pain scale and the BECK anxiety scale were re-applied on the patients and the patients were mobilized. Then, the Patient Mobility Scale, the Observer Mobility Scale, and the patient mobilization questionnaire were applied. The patients were interviewed once every 24 hours. The data collection form was evaluated for 3 days.

Statistical Analysis

The data obtained from the study were evaluated using SPPS 20 (IBM SPSS Corp., Armonk, NY, USA). The distributions of variables were given by using mean, standard deviation, median, percentage and frequency values. The suitability of the repeated measures for the variance analysis was evaluated by Mauchy's Sphericity Test and Box-M Variance Homogeneity Test. When comparing the means, the repeated measures variance analysis was used as one of the factors in the factorial order. In multiple comparisons, the Adjusted Bonferroni Test was applied. Shapiro Wilk's and Levene Test were used to determine the homogeneity of the variances from the normal distribution. Comparisons between two groups were made using the Student's test for a parametric distribution and Mann Whitney-U test for nonparametric variables. The t test was used when the parametric test preconditions were provided, and the Mann Whitney-U test was used if not. The relationship between the variables was evaluated with Spearman Correlation Coefficient for nonparametric variables. The categorical data were analyzed by Fisher's Exact Test test. For the significance level of the tests, $P< .05$ was accepted.

Ethical Considerations

Prior to the implementation of the study, the approval was obtained from Karabuk University Non-Interventional Clinical Research Ethics Committee (date:31.05.2017, 77192459-050.99/428466). In order to carry out the study in the hospital, the permission of the General Secretariat of Public Hospitals Association was obtained (88919140/604.99). The study design and intervention techniques were explained to each patient, who then signed an informed consent. This study was conducted in accordance with the principles set out in the Declaration of Helsinki.

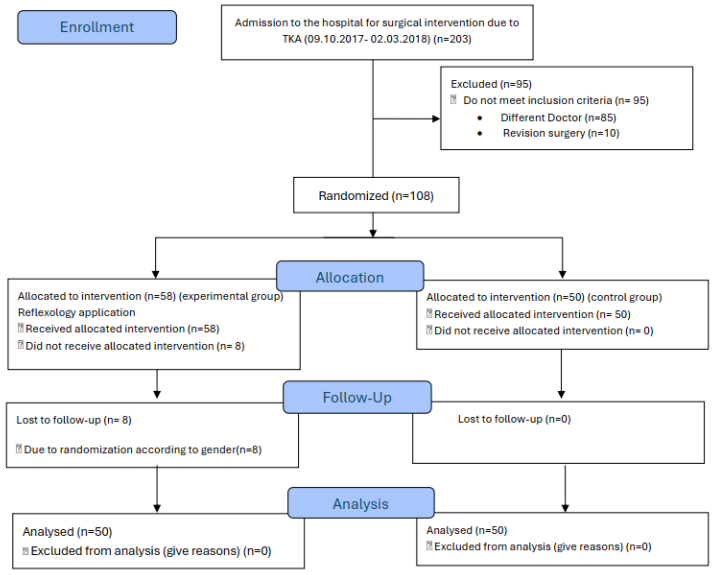

Figure 1. The CONSORT Flow Diagram of the Groups Enrollment, Allocation, Intervention, Follow-Up, and Analysis

RESULTS

Table 1 presents the socio demographic characteristics of the patients. The mean age of the patients in the experimental group was 64.8 ± 7.86 and the mean age of the patients in the control group was 66.24 ± 7.29. In the experimental and control groups, 86% of the patients were female. By examining the table, it was found that 72% of the patients in the experimental group and 88% of the patients in the control group had a chronic disease. These results show that in both groups, the individuals are homogeneous apart from the chronic disease. The homogeneity of the groups is thought to be important for determining the effectiveness of reflexology.

Table 2 shows the distribution of the mean VAS pain scores levels of the patients in the experimental group. When the VAS pain scores level of the patients in the experimental groups were evaluated, statistically significant difference

Table 1. Socio-demographic Characteristics of the Patients (n= 100)

Socio-demographic characteristics	Experimental Group (n=50)		Control Group (n=50)		Statistical analysis	
Age (year)						
Mean±SD	64.8±7.86		66.24±7.29		1.212*	.331
Gender	**n**	**%**	**n**	**%**	t/χ^2	***P***
Female	43	86.0	43	86.0	0.088**	.766
Male	7	14.0	7	14.0		
Marital status						
Married	45	90.0	41	82.0	1.329**	.766
Single	5	10.0	9	18.0		
Education status						
İlliterate	13	26.0	15	30.0	0.507**	.616
Literate	14	22.0	8	16.0		
Primary School	21	42.0	26	52.0		
Secondary school graduate and above	2	4.0	1	2.0		
Job status						
Housewife	42	84.0	40	80.0	0.271**	.603
Other***	8	16.0	10	20.0		
Chronic disease						
Yes□	36	72.0	44	88.0	4.00**	.046
No	14	28	6	12.0		

□Diabetes, Hypertension *t-test (Student's t test); **Fisher's Exact Test

Table 2. VAS Pain Scores of the Patients in the Experimental Group According to the Follow-up (n = 50)

Follow up / Pain Score	0.Day Mean±SD	1.Day Mean±SD	2.Day Mean±SD	Statistical analysis (F□/*P*)
Before application	8.24±1.70	5.32±1.89	4.32±1.37	12.457/ .004**
After application	4.86±2.22	2.40±2.11	1.26±1.22	6.345/ .02**
Statistical analysis t/*P*	4.589/ .004**	5.877/ .002*	6.997/ .001*	

** P values (P< .01). ** P values (P< .05).* *** Student's t test
□ Repated measures analysis variance was applied.

was found between the follow-up (P< .01; P< .05). It was found that post-reflexology pain scores of patients decreased.

Table 3 shows the distribution of mean VAS pain scores of the patients in the experimental and control groups according to the follow-up. When the mean pain scores of the patients in the experimental and control groups were examined, it was found that the mean scores of the patients in the experimental groups decreased and the difference between groups was statistically significant (*P*< .05; *P*< .001).

Table 4 shows the distribution of the mean BECK anxiety levels of the patients in the experimental and control groups. When the BECK anxiety level of the patients in the experimental and control groups were evaluated in-group, no statistically significant difference was found between the follow-up (*P*> .05). When compared with the control group, the mean anxiety scores of the patients in the experimental group were lower than the control group, and the difference between groups was statistically significant (*P*< .05).

Table 3. Distribution of VAS Pain Scores of the Patients in the Experimental and Control Groups According to the Follow-up (n = 100)

	0.Day	1. Day	2. Day	*P*
Experimental Group	4.86±2.22[a]	2.4±2.11[a]	1.26±1.22[a]	.02**
Control Group	8.20±1.32	5.64±1.80	5.26±1.78	.005
Statistical analysis t/P	4.72/ .003*	3.96/ .047*	7.56/ .001**	

P values (P <.05). **P values (P <.01).* * Student's t test [a] Mean pain score after reflexology

Table 4. Distribution of Beck Anxiety Overall Mean Scores of the Experimental and Control Groups According to the Follow-up

	Day of Surgery	Postoperative Day 1	Postoperative Day 2	F/*P*
Experimental Group	23.38±2.39	23.02±2.22	22.10±1.12	2.207/ .227[Δ]
Control Group	29.58±5.54	29.40±5.55	28.22±4.19	0.998/ .632[Δ]
Statistical analysis	644.50[Ψ] .04*	558.50[Ψ] .039*	4.552[Ω] .035*	

** P values (P< .05).* Ω Student's t test Ψ Mann-Whitney- U [Δ] Repated measures analysis variance was applied.

Table 5 presents a comparison of the mean scores from the patient mobility scale and the observer mobility scale based on the follow-up of patients in both the experimental and control groups. It was found that the mean scores of the patient mobility and the observer mobility scale of the experimental group patients decreased, and this difference was statistically significant (*P*< .05; *P*< .001).

Table 6 shows the relationship between the pain scores and the number of mobilizations on the first and second day of the experimental and the control groups. Only a statistically significant negative correlation was found between the pain on the second day and the number of mobilizations on the second day (r = -0.340, *P*= .016). When the pain score of the experimental group decreased compared with the follow-up, the number of mobilizations increased.

Table 5. Comparison of Patient Mobility Scale and Observer Mobility Scale Mean Scores of the Experimental and Control Groups According to the Follow-up (n = 100)

	Patient Mobility Scale Mean ±SD	
	Postoperative Day 1	Postoperative Day 2
Experimental Group	38.34±12.73	30.42±8.78
Control Group	61.56±18.95	53.1±15.01
Statistical analysis t□/*P*	5.700/ .001**	2.719/ .009*
	Observer Mobility Scale X±SD	
Experimental Group	6.85±2.73	4.60±1.14
Control Group	10.70±3.03	8.02±2.28
Statistical analysis t/*P*	6.037/ .001**	4.931/ .001**

** P values (P< .05) ** P values (P< .001)* □ Dependent t-test was applied.

Table 6. The Relationship Between the Mean Number of Mobilization and Pain Scores on the First and Second Postoperative Day of the Patients in the Experimental and Control Groups

			Mobilization Number	
			Postoperative Day 1 (r/*P*)	Postoperative Day 2 (r/*P*)
Experimental Group	**Pain**	**1. Day**	0.030 / .834	-0.039 / .790
		2. Day	-0.191 / .184	-0.340 / .016
Control Group	**Pain**	**1. Day**	-0.235 / .100	-0.116 / .421
		2. Day	-0.260 / .069	-0.067 / .643

** P< .05 ** P< .001* r: Spearman Correlation Coefficient

DISCUSSION

After performing the total knee arthroplasty surgery, among the primary goals of the nursing care is to provide the individual with the highest level of independence to prevent complications and maintain the pain and anxiety management effectively in order to ensure the patient's satisfaction to perform the daily living activities. In this domain, nurses, who are an indispensable member of the health team, have an effective role in the postoperative period. Based on reviewing the literature, orthopedic patients felt high levels of pain in the first 3 days after surgery as well as experienced anxiety and compliance with prosthesis.[2,13,23] Therefore, this study aimed at evaluating the effectiveness of foot reflexology, which is one of the non-pharmacological methods in alleviating and reducing the level of pain and anxiety during the postoperative period.

One of the most common problems experienced by patients undergoing surgical intervention in the postoperative period is pain.[3] In the prospective cohort study by Gerbershagen et al.[7] on 115,775 patients which were evaluated at the first postoperative day in terms of pain severity, the highest pain score was found in orthopedic patients. In the current study, the mean pain level of the patients in the experimental group before the application on the surgery day was 8.24 ± 1.70, while the patients in the control group were found to be 8.20 ± 1.32. Despite the multimodal analgesia protocol, the patients in this study had severe pain. In this study, it was found that the mean pain score decreased after reflexology and this decrease was statistically significant. This result shows the importance of the present study since no previous study has followed the application of reflexology in TKA patients. Kukimoto et al.[24], meta-analysis study, reported that massage therapy has a short-term positive effect in a postoperative pain management and may be a part of multi-model pain management. In another randomized controlled study that examined the effect of reflexology on abdominal pain and anxiety after abdominal hysterectomy, a statistically significant reduction in pain and anxiety levels was found in patients after reflexology.[17] In addition, in a study examining the effect of reflexology on pain and sleep quality in patients with rheumatoid arthritis, they found that the pain level of patients in the experimental group decreased.[25] Taking into consideration the findings of all these studies, it can be reported that foot reflexology can be used as a supportive in coping with postoperative pain, and the results of this study may contribute to the nursing literature.

Another finding of the present study revealed that the mean postoperative pain score of the patients in the control group decreased compared to the follow-up (8.20 ± 1.32; 5.64 ± 1.80; 5.62 ± 1.78) and the difference was statistically significant. This represents the most important problem of patients in the postoperative period pain. Starting with surgical trauma, it can be explained as progressive reduction.[2,6] It can be said that reflexology application is effective in reducing pain in patients with total knee arthroplasty. By comparing the pain scores of the experimental and control group patients, it was found that the pain scores of the patients in the experimental group decreased. This finding confirms the H1.1 hypothesis.

The patient perceives anesthesia, surgical intervention and postoperative pain as a hazard, and both pre- and post-operative anxiety occur with this perception.[13,26,27] Based on reviewing the literature, it was found that reflexology has been used as an effective complementary treatment for reducing the anxiety levels.[18,28] According to the theory of perception of nerve receptors reflexology application,

the reflex regions of the feet affect the organs and organs are established between the reflex regions. It is argued that with the help of neurons, related organs are stimulated, creating relaxation and comfort, and this relaxation affects the autonomic response, endocrine, immune and neuropeptide system.[29] In the present study, it was found that the mean anxiety score of the patients in the experimental group decreased compared to the patients in the control group, and this decrease was statistically significant (*P*< .05). In the literature, the effect of reflexology on anxiety was examined, and it was found that reflexology was effective in reducing the anxiety experienced by patients.[18,27,30] Similarly, in this study, foot reflexology can be reported to be effective in reducing the anxiety. Reducing the anxiety experienced by patients and improving their quality of life are among the primary responsibilities of nurses due to their caregiving role. It is thought that reflexology reduces the anxiety level in patients undergoing total knee arthroplasty and that reflexology can be included in routine nursing practices if supported by similar studies. This finding confirms the H1.2 hypothesis.

Efficient nursing care is required to reorganize the postoperative deteriorated homeostasis to prevent early diagnose of the surgical complications and maintain normal functioning of all systems. In this regard, one of the most important parameters of effective nursing care is moving the patient to the extent that she/he can tolerate and encouraging him/her to do active and passive exercises.[31,32] Yolcu et al.[33] discovered that patients experienced varying degrees of difficulty with movement during the postoperative period, requiring increased support and encouragement, particularly when standing and walking. In the present study, when the postoperative 1st and 2nd day mobility of the patients was evaluated, it was found that the main patient mobility scale score of the experimental group patients was significantly lower than the control group. The increased score indicates increased pain and a difficulty with respect to the activity. Evaluation of the patients' mean scores on the observer mobility scale revealed that the control group had significantly higher scores, with the difference being statistically significant (*P*< .05). As the mean scores of the observer mobility scale of the patients increased, their dependence on the mobility increased. In the study, it was determined that the mobility of the experimental group increased compared to the control group. In this regard, it can be said that foot reflexology increases the mobility level of patients. This finding confirms the H1.3 hypothesis.

Limitations

The universe of the study was limited to patients who applied to the Orthopedics and Traumatology Clinic of Karabuk University Training and Research Hospital. The fact that the study sample consisted of patients who underwent knee arthroplasty surgery performed by the same physician, so that there were no differences in treatment protocol and surgical practice, can be considered as a strength of the study. Since total knee arthroplasty surgery is more common in female patients and the number of men and women could not be equalized, the high number of female patients can be considered as a limitation of the study. The fact that the research results only represent the group that received reflexology after knee arthroplasty can be considered a limitation of the study.

It is observed that especially after TKA operations, which is a large and painful surgical procedure, patients' movements and their quality of life due to pain are negatively affected. In this study, it was found that foot reflexology is an effective method in reducing pain and anxiety in patients with knee arthroplasty, and the mobility level and mobilization numbers of patients who underwent reflexology were higher. Finally, it is recommended to conduct experimental and qualitative studies on the effects of reflexology on patients undergoing total knee replacement surgery. In addition, long-term follow-up studies will contribute greatly to this field.

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