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Effects of Foot Reflexology on Severity of Pain and Opioid Dosage Administered to Patients Undergoing a Discectomy: A Randomized Clinical Trial

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Abstract

Objectives: The present study aimed to investigate the effects of foot reflexology on the severity of pain and opioid dosage administered to patients undergoing a discectomy.

Materials and Methods: The present randomized clinical trial (concurrent parallel) was conducted including two experimental groups. In general, 60 patients were selected from Imam Reza and Shohada hospitals of Tabriz based on convenience sampling and then randomly assigned to the intervention (n=30) and control (n=30) groups based on randomly permuted blocks. Four hours after the surgery and the last dosage of pethidine, patients in the intervention group received massaging of both feet 20 minutes per day for 2 days while those in the control group received no intervention. The data were collected using a demographics and visual analogue scale (VAS) checklist and then were statistically analyzed using chi-square, Fisher exact test, and the independent t-test in SPSS-21 at the 0.05 level of significance.

Results: After the intervention, the severity of pain significantly reduced in the intervention group ($P<0.001$) but it did not change in the control group ($P>0.410$). The results indicated no significant difference between the two groups in pre-intervention pethidine dosage ($P>0.490$). After the intervention, pethidine dosage significantly decreased in the intervention group on all days ($P<0.001$), but no significant change was observed in the control group ($P>0.499$).

Conclusions: Considering the positive effects of foot reflexology on the severity of pain and reduced dosage of the required opioids for pain control, this technique is recommended to be used as a perfect complementary therapy, along with other treatments to reduce postoperative pain in patients undergoing a discectomy.

Keywords: Foot reflexology, Discectomy, Severity of pain, Opioids

Introduction

Surgeries on the spinal column are considered among the most painful medical procedures. Due to extensive neurological damages in such surgeries, postoperative pain control is quite important to both physicians and patients. Improper pain control in such patients can lead to undesirable outcomes (1).

Supplementary therapies such as massage act as a supportive intervention for improving all painful experiences during hospitalization. Reflexology or foot massage is a natural and old treatment. Reflexologists believe that all body organs and glands are connected to reflex areas on the feet, hands, and ears (2). They claim that they can reduce tensions, improve blood circulation and normal functioning of related areas, and finally, reduce pain in the corresponding body parts by applying pressure to the feet and hands with specific thumb, finger, and hand techniques without the use of oil or lotion (3). Although the desirable results of foot reflexology have been observed in some surgeries, this technique has been less used for patients undergoing surgery on their spinal cord (4,5). On the other hand, some studies have reported that foot reflexology cannot properly reduce postoperative pain (6,7). Regarding the complications of opioid drugs and the fear of using these drugs, the use of non-prescriptive methods is necessary for reducing pain after a discectomy. In addition, there are a few studies about the effects of foot reflexology on the severity of pain after a discectomy and surgeries of the spinal cord. Therefore, the present study mainly aimed to evaluate the effects of foot reflexology on the severity of pain and opioid dosage administered to patients undergoing a discectomy.

Materials and Methods

The current randomized clinical trial (concurrent parallel, double-blind) included two experimental groups in order to determine the effects of foot reflexology on the severity of pain and opioid dosage administered to patients undergoing a discectomy. The inclusion criteria were a minimum literacy level of writing and reading, lack of

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Key Messages

- The pain after discectomy is very severe.
- Attempt to control pain after discectomy is non-pharmacological.
- Foot reflexology led to the control of pain after discectomy.

having a surgical procedure other than a discectomy, no history of foot reflexology, no history of taking sedatives, analgesics, or anxiolytics such as Inderal (propranolol) for more than a month, non-addiction to drugs, non-affliction with known diseases such as cardiovascular diseases, diabetes, visual impairment, and hearing loss, the health of feet, and a score of 3 or more on the visual analogue scale (VAS) checklist. On the other hand, the exclusion criteria included preoperative complications such as severe bleeding or acute infection, the need for admission to the intensive care unit, and lack of complete consciousness during the intervention. In addition, other exclusion criteria were unpleasant feelings and complaints during the intervention, an unwillingness to continue the study, the need for taking painkillers more than the routine, and the arbitrary use of painkillers by patients.

The study population consisted of patients undergoing a discectomy who were willing to participate in the study. The participants were selected based on convenience sampling from patients meeting the inclusion criteria in Imam Reza and Shohada hospitals of Tabriz. The sample size was determined based on a sample size formula considering a confidence level of 95% and a test power of 80% (8). As a result, 30 patients undergoing a discectomy were selected from each hospital (15 patients for the intervention group and 15 patients for the control group). Considering an attrition rate of 20%, a total of 60 patients were selected from the 2 hospitals for the study (8). The participants were assigned to intervention and control groups based on randomly permuted blocks.

The required data were collected using a demographics form and the VAS checklist. Demographic characteristics included age, gender, occupation, educational attainment, marital status, number of children, anesthetic status, number of postoperative suppositories, height, weight, body mass index (BMI), and the pethidine dosage consumed within 48 hours after the surgery. VAS is a visual scale as a horizontal ruler graded from 0 to 10 that measures the severity of pain. On this ruler, 0 and 10 denote no pain and very severe pain, respectively (9). Based on Cronbach's alpha, the reliability of this scale was obtained 0.89-0.91 (10). Its reliability and validity have been also confirmed in Iran (11).

The demographic information of participants was recorded by an assistant researcher who was unaware of participants' assignment to experimental groups. The participants were trained for using the VAS checklist before the surgery. After the surgery and when the participants were admitted to the brain surgery ward, their severity of pain was measured and recorded using the VAS checklist and those with a score of 3 or more were selected for the study. Then, foot reflexology was performed by a skilled physiotherapist for 20 minutes for each patient in a separate room. First, the physiotherapist attempted to establish a friendly relationship with patients by taking their medical history and then asked them to comfortably lie down in a prostrate position. Before starting the massage, the physiotherapist washed his/her hands with lukewarm water and dipped them into a baby oil with no healing value, and then cleaned the patients' feet with a wet towel. The foot massage consisted of 20 actions in 3 steps. First, the right foot was massaged with the first 6 actions that generally lasted 1.5 minutes (each action lasted 15 seconds). The right foot was covered with a towel and the same actions were performed on the left foot for 1.5 minutes. After covering the left foot, the second 6 actions were performed on both feet for 1.5 minutes. The third step included 8 actions that were simultaneously performed on both feet in 7 minutes. In this step, the first two actions were performed in 1 minute and each of the next actions lasted for 1 minute. Specialized massage exercises including rubbing, rotating, stretching, gripping, and bending were performed on different parts of the foot from the ankle to toes for 20 minutes (10 minutes for each foot) once a day for 2 consecutive days (12). The first massage exercise was performed at 5-9 PM at least 4 hours after the surgery and the second one was performed 24 hours later at the same time. In the control group, the physiotherapist was present at the patients' bedside and attempted to establish a friendly relationship with patients by taking their medical history in order to determine the pure effect of massage on pain reductions by controlling the effect of the masseur's presence. Thirty minutes after the 2 sessions of intervention, the assistant author measured and recorded the patients' severity of pain using the VAS checklist. All patients received analgesics according to the routines of the studied hospitals and there was no difference between the 2 groups in this regard. The pethidine dosage administered to patients was recorded 11 hours before and after the intervention. It is noteworthy that the author, the data analyzer, and the physician were unaware of grouping and intervention.

Ethical considerations were fully observed like other studies (13-15). All patients were briefed on the research objectives and procedure and were assured of discontinuing the study at any stage. Then, an informed written consent form was obtained from all patients. In addition, necessary arrangements were made with the authorities and matrons of the studied hospitals.

Statistical Analyses

Chi-square test and Fisher exact test were used to compare the intervention and control groups in terms of demographics. In addition, the independent t-test was

employed to compare the two groups regarding the pre- and post-intervention mean score of pain. All statistical analyses were performed in SPSS 21 at the 0.05 level of significance.

Results

In total, 80 patients were identified for the study while excluding 20 cases due to the lack of entry criteria. After random allocation to control and intervention groups, 30 patients received the intervention, none of who were eliminated during the intervention, and statistical analysis was performed for every 30 people (Figure 1).

The mean age and the mean BMI of patients were 58.50 ± 8.20 and 29.80 ± 3.2250, respectively. The majority of patients (n = 48, 80%) were males, half of them (n = 30, 50%) had a high school diploma, 71.66% (n = 43) of them were clerks, 71.66% (n = 43) of them were married, and all of them (n = 60, 100%) were under general anesthesia. Table 1 presents the results of the chi-square test and the independent t-test for comparing the intervention and control groups in terms of demographics.

The results of the independent t-test showed that there was no significant difference between the intervention and control groups in terms of the pre-intervention severity of pain on the first, second, and third days ($P > 0.419$). However, there was a significant difference between the two groups in severity of pain after the intervention ($P < 0.001$). Based on the results of the independent *t* test (Table 2), the severity of pain significantly reduced in patients in the intervention group on all days of the study ($P < 0.001$) while it changed significantly in the control group in none of the study days ($P > 0.410$).

The results further demonstrated that there was no significant difference between the intervention and control groups in terms of the mean pethidine dosage before the intervention ($P > 0.490$). However, a significant difference was found between the two groups in this regard after the intervention ($P < 0.001$). The results of the independent *t* test (Table 3) also revealed that the pethidine dosage administered to patients in the intervention group was significantly lower than that of the control group on all days ($P < 0.001$).

Discussion

The present study aimed to investigate the effects of foot reflexology on the severity of pain and opioid dosage administered to patients undergoing a discectomy. Researchers believe that massage therapy and reflexology are simple and learnable treatments that can be applied to a wide range of clinical problems. Because of its simple and easy nature, reflexology can increase patients' involvement in self-care (16). On the other hand, studies have shown that reflexology can reduce anxiety, improve the components of life quality and sleep quality, and relax the patient by reducing the severity of pain (17). In the present study, foot reflexology managed to reduce the

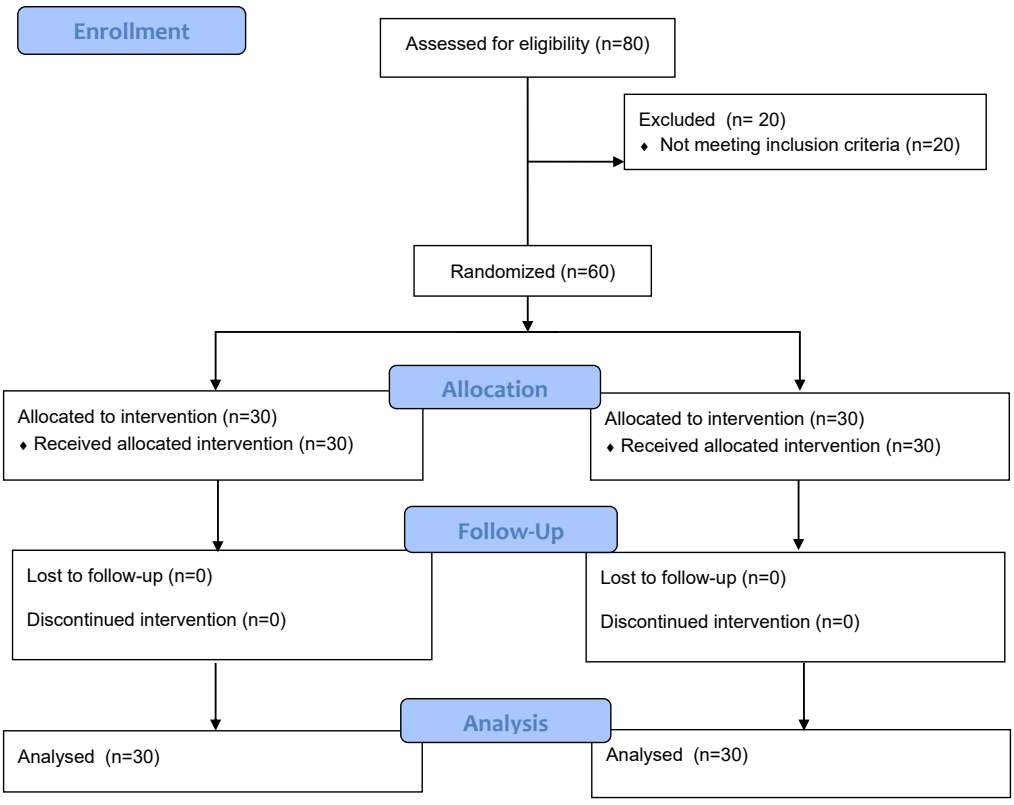

Figure 1. The Flow Chart of the Recruitment and Retention of Participants.

Table 1. Comparison of Patients in the Intervention and Control Groups in Terms of Demographics

Variables	Intervention			Control			*P* Value
	Mean±SD	Max	Min	Mean±SD	Max	Min	
Age (year)	59.75±8.45	70	45	60.25±8.50	77	46	0.495
Weight (kg)	85.90±12.20	92	75	87.20±11.30	90	69	0.505
Height (cm)	169.50±15.45	186	157	163.50±14.59	182	153	0.611
BMI (kg/m^2)	31.15±3.10	22.30	35	29.15±3.15	25	36.1	0.399
Occupation (n, %)							
Housewife	9-30%			8-26.66%			0.7
Clerk	21-70%			22-73.34%			
Educational attainment (n, %)							
Less than high school	5-70%			7-70%			0.523
High school	16-70%			14-70%			
University degree	9-70%			9-70%			
Number of children (n, %)							
0-2	28-93.33%			26-86.66%			0.7
2-4	2-06.64%			4-13.34%			
Anesthesia status (n, %)							
General anesthesia	30-100%			30-100%			1

Table 2. Comparison of Patients in the Intervention and Control Groups in Terms of Severity of Pain

Day		Intervention (Mean±SD)	Control(Mean±SD)	*P* Value
First	Before the intervention	04.75±0.33	04.82±0.60	0.565
	After the intervention	2.88±0.15	04.78±0.55	<0.001
	P value	<0.001	0.411	-
Second	Before the intervention	04.11±0.15	04.03±0.10	0.420
	After the intervention	01.99±0.15	04.00±0.05	<0.001
	P value	<0.001	0.686	-
Third	Before the intervention	3.25±0.20	3.18±0.15	0.636
	After the intervention	01.10±0.25	03.20±0.20	P<0.001
	P value	<0.001	0.709	-

Table 3. Comparison of Patients in the Intervention and Control Groups in Terms of Pethidine Dosage

Day		Intervention (Mean±SD)	Control(Mean±SD)	*P* Value
First	Before the intervention	20.12±2.25	18.95±1.70	0.501
	After the intervention	12.35±1.20	20.03±2.15	<0.001
	P value	<0.001	0.506	-
Second	Before the intervention	18.55±1.50	18.30±1.21	0.629
	After the intervention	11.03±0.79	17.91±1.11	<0.001
	P value	<0.001	0.512	-
Third	Before the intervention	12.03±0.55	11.75±0.20	0.491
	After the intervention	06.10±0.36	10.50±0.55	<0.001
	P value	<0.001	0.500	-

severity of pain after discectomy, which is one of the painful surgeries. This subsequently reduced the opioid dosage administered to patients and, as a result, the unwanted side effects of these drugs.

Although many studies have been conducted to investigate the effects of foot reflexology after various surgical procedures, there is a limited number of studies that have focused on the effects of foot reflexology on the post-discectomy severity of pain and opioid dosage. Therefore, the authors have to compare the results of the present study with the findings of studies conducted on other surgical procedures. Sahbaee et al investigated the effects of reflexology on the severity of pain in patients with scoliosis after the surgery on the spinal cord and reported

that reflexology had positive effects on the reduction of pain and proper management of postoperative pain (8). In another study conducted by Lalehgani et al, it was shown that foot reflexology had positive and beneficial effects on post-discectomy pain management. They also concluded that this technique can be widely used as a complementary therapy in patients undergoing surgery on the spinal cord (1). The results of the above-mentioned studies are consistent with the findings of the present study in terms of the positive effects of foot reflexology on postoperative pain management. Other studies about the effects of reflexology on patients undergoing heart surgery (18), thoracic surgery (19), and cesarean section (20) also reported similar results. Eghbali et al evaluated the effects of foot reflexology on the severity of low back pain in nurses and showed that reflexology had positive effects on reducing low back pain (21). Another finding of the present study demonstrated that foot reflexology dramatically reduced the opioids dosage administered to patients. Consistent with the results of this study, Stephenson et al reported a significant reduction in the opioids dosage administered to patients following foot reflexology (17).

In the present study, foot reflexology had short-term effects on the reduction of postoperative pain, and it again increased on the day after reflexology. Keller et al investigated the effects of 8 weeks of massage therapy on the severity of pain after a discectomy and concluded that this technique had short-term effects on pain reductions and patients' severity of pain increased after one week (22).

Conclusions

Considering the study findings and the further reduction of pain severity in the intervention group compared with the control group, foot reflexology can be used as a perfect complementary therapy, along with other treatments to reduce postoperative pain in patients undergoing discectomy. Based on the findings, a reduction was found in the severity of pain in patients who received foot reflexology and the use of complementary therapies did not cause unwanted side effects in patients. Therefore, massage therapy and reflexology can be used as simple and learnable treatments for reducing the severity of pain after discectomy.

Limitations of the Study

One of the research limitations was the difference between patients in pain threshold which may cause a difference in the severity of pain expressed by patients and affect the evaluation results. In addition, all answers of the participants were considered correct and it was possible for the author to check all answers. On the other hand, the psychological status, family problems, and physical conditions of the participants when completing the questionnaire were not taken into account, which would affect the results. Compared to other studies conducted in this area, one of the strengths of the present study was the presence of the physiotherapist, along with the patients in the control group in order to determine the pure effect of massage on pain reductions by controlling the effect of the masseur's presence. Other strengths of this study included the homogeneity of the study groups in terms of gender, type of surgery, type of anesthesia, and analgesics dosage administered to patients, random assignment of participants to the intervention and control groups, and unawareness of the assistant researcher about grouping and interventions.

Suggestions for Future Studies

Based on the study findings, future studies are recommended to investigate the long-term effects of foot reflexology and its impact on chronic pains.

Authors' Contribution

MKG: Study design, intervention; DA: Intervention, submission, article writing.

Conflict of Interests

Authors have no conflict of interests.

Ethical Issues

The research project was approved by the Ethics Committee of Tabriz University of Medical Sciences (ethics no. IR.TBZMED.REC.1397.1059) and registered at the Iranian Registry of Clinical Trials website (identifier: IRCT20120605009948N6; https://www.irct.ir/trial/38485).

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