

## Effect of Foot Reflexology and Gentle Stretching Exercises on Pain Intensity in Patients after Spine Surgery: A Randomized Controlled Trial

Mahmoud Bakhshi<sup>1\*</sup>, Hossein Ranjbar<sup>2</sup>, Ommolbanin Rostami<sup>3</sup>, Hamid Chamanzari<sup>4</sup>, Hamidreza Bahrami-Taghanaki<sup>5</sup>

### Abstract

**Background:** The side effects of long-term use and high doses of drugs have increased the use of complementary therapies for the reduction of pain.

**Aim:** The present study aimed to compare the effect of foot reflexology and gentle stretching exercises on pain intensity in patients after spine surgery.

**Method:** This clinical trial study was performed on 90 patients undergoing spinal surgery referring to hospitals affiliated to Mashhad University of Medical Sciences in 2019. Patients were randomly assigned to three groups: foot reflexology, gentle stretching exercises, and control. In intervention groups, apart from the routine procedures, foot reflexology or gentle stretching exercises were performed daily from the first day after surgery until discharge, and also three times a week for six weeks after discharge. In the control group, only routine care was performed.

**Results:** The mean age of the samples was  $43.35 \pm 11.15$  years. In within-group comparison, the mean pain intensity was significantly decreased at the end of the sixth week after surgery in all three groups ( $P < 0.001$ ). The mean of pain intensity in the reflexology group was lower than that in the stretching exercise group on the second day after surgery, discharge time, as well as the first and sixth weeks after discharge ( $P < 0.001$ ). Nonetheless, there was no significant difference between the stretching exercise group and the control group ( $P < 0.05$ ).

**Implications for Practice:** Foot reflexology effectively reduces the pain intensity of patients after spinal surgery. Therefore, it is recommended to be performed by patients or their caregivers to reduce pain after spinal surgery.

**Keywords:** Foot reflexology, Pain, Spine surgery, Stretching exercises

- 
1. Nursing and Midwifery Care Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
  2. Assistant Professor, Department of Community Health Nursing, School of Nursing and Midwifery, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
  3. MSc in Nursing, Department of Medical-Surgical Nursing, School of Nursing and Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran
  4. Instructor, Department of Medical-Surgical Nursing, School of Nursing and Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran
  5. Associate Professor, Department of Chinese and Complementary Medicine, School of Persian and Complementary Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

\* Corresponding author, Email: bakhshim@mums.ac.ir

## Introduction

Severe postoperative pain following spinal surgery has always been a major health problem (1). Spine surgery, like other operations, is associated with severe pain, especially in the early days after surgery (2, 3). Typically, 75% of patients undergoing surgery experience acute postoperative pain (4). In one study, out of the 1,300 patients who underwent spinal surgery, 57% reported uncontrolled pain during the first 24 hours after surgery (3).

Postoperative pain control is closely linked to favorable therapeutic outcomes, such as adequate mobility, prompt discharge, prevention of chronic pain (2), as well as increased patient satisfaction, reduced opioid dependence, and lower costs (5). Therefore, different types of medicines are used to help the effective management of postoperative pain. Each of these drugs brings its own inherent advantages and disadvantages that limit their common use (1). Consequently, complementary medicine is increasingly used to reduce the side effects of drugs (6,7). The terms complementary medicine or alternative medicine are used interchangeably with traditional medicine in some parts of the world.

Traditional medicine encompasses the knowledge, skills, and behaviors that are used to prevent, diagnose, manage, and maintain health. It includes traditional Chinese, Indian, and Malay medicine, as well as homeopathy and complementary therapies (8). Some methods, such as cupping therapy, osteopathy, acupuncture, homeopathy, music therapy, and reflexology, are common examples of traditional and complementary medicine(9). The term complementary indicates that the therapy is used, along with conventional medicine, and may include supplements, massage, and exercise-based programs (10)

The use of gentle stretching exercises is one of the most common methods to relieve patients' pain after the surgery (11). These exercises have been demonstrated to be effective in the reduction of musculoskeletal pain in nursing staff (12) and strengthening leg muscle strength in patients with plantar fasciitis (13). Gentle stretching exercises are the activities undertaken to regain, increase, or maintain the range of motion of limbs. These activities involve passive or active stretching that is performed individually or with the help of another person (therapist/trainer) (11).

Reflexology is also a traditional complementary therapy that is performed by applying pressure on the reflex points and areas of the feet, hands, ears, and face which represent different parts of the body. The inner curvature of the sole is related to the reflex points of the lumbar and spine vertebrae (14, 15). Foot reflexology has been recently recognized as an important complementary treatment in many health-related problems, especially in some conditions associated with chronic diseases, such as anxiety, stress, pain, and fatigue (16, 17).

Some studies have compared the effects of stretching exercises and reflexology on the reduction of patients' pain (18-20) and reported contradictory results. For example, Shagholian et al. (2016) demonstrated that both stretching exercises and reflexology reduced the severity of restless legs syndrome (18). In the study by Sadeghi et al., although stretching exercises were effective in the reduction of pain intensity in patients with rheumatoid arthritis, reflexology alone had no effect on the mitigation of pain experienced by these patients (19). Imani et al. reported the beneficial effects of foot reflexology on the reduction of pain in patients after tibial bone surgery (20).

Although the effects of stretching exercises and reflexology on pain have been compared in some studies, little is known about comparing the effects of these two complementary medicine techniques on postoperative pain intensity after spinal surgery. The severity of pain in spinal surgery is higher, as compared to that in other surgeries. In a related study, researchers revealed that out of 179 surgical procedures, spinal surgery was one of the six surgeries with the most postoperative pain (4); moreover, the frequency of persistent pain after spinal surgery is 5%-75% (21, 22). Therefore, considering the result of previous studies and in order to bridge the existing information gap, the present research aimed to compare the effect of foot reflexology and gentle stretching exercises on pain intensity in patients after spine surgery.

## Methods

This randomized, controlled, three-group clinical trial study was conducted on 90 patients undergoing spine surgery in hospitals affiliated to Mashhad University of Medical Sciences, Mashhad, Iran. Patients were selected based on the inclusion criteria and randomly assigned to three groups (foot reflexology, gentle stretching exercises, and control) using computer-generated random numbers (Figure 1). The inclusion criteria entailed the age range of 18-65 years,

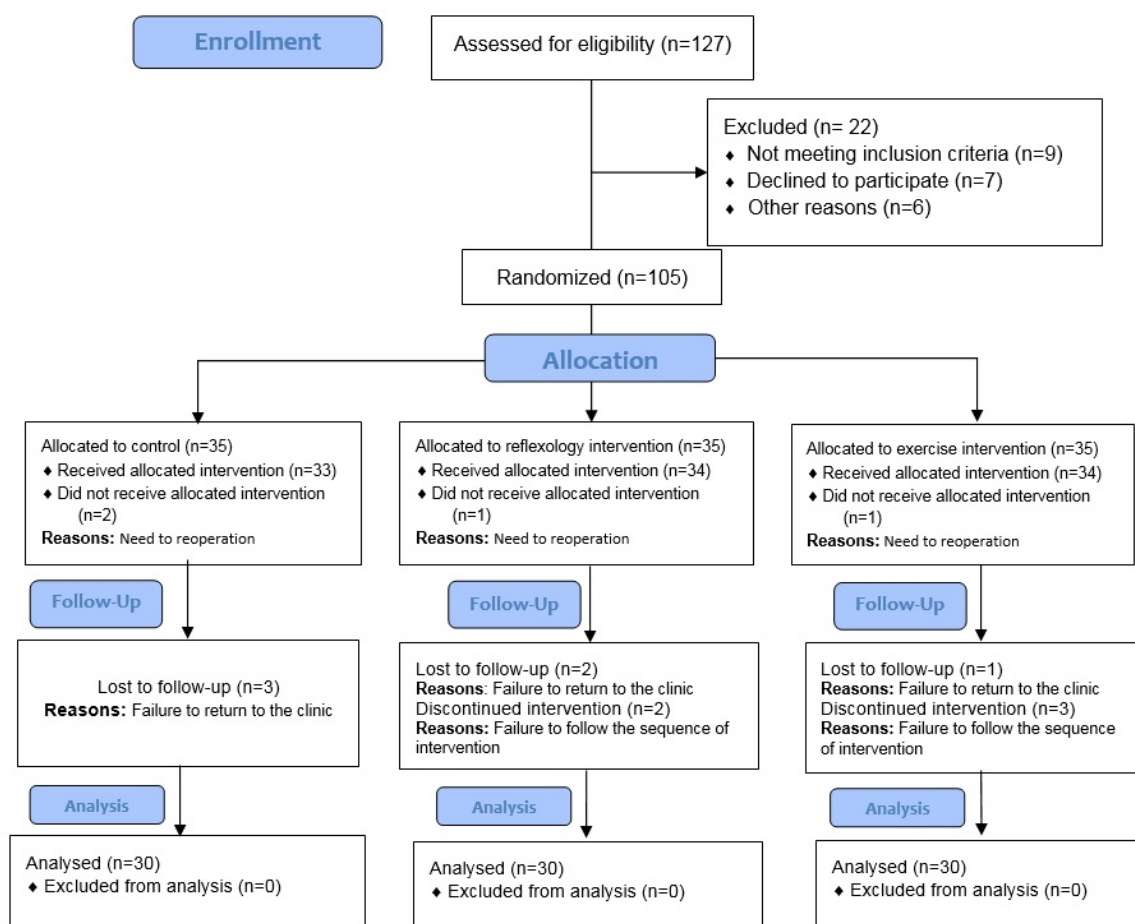
hospitalization for spinal or lumbar spine surgery, no alcohol and drug addiction, no wounds, fractures, as well as sensory and motor disorders in the limbs, and willingness to participate in the study. On the other hand, the need for reoperation, length of hospital stay more than 10 days, and the occurrence of neurological defects after surgery were regarded as the exclusion criteria.

Before the surgery, participants were provided with the objectives of the study; thereafter, patients' demographic and clinical characteristics form was completed. This form contained 15 questions on gender, age, body mass index (BMI), marital status, level of education, occupation, history of analgesic use, type of spine surgery, and spine instrumentation.

The intervention started on the second day after the surgery. In the foot reflexology group, the patients and their companions were taught how to perform reflexology while the patient was lying on the bed. Based on the results of previous studies, reflexology can be successfully provided by the partners, patients, or their caregivers who were trained by a specialist (23-25). To perform reflexology, a person should hold the heel of one foot with one hand and apply intermittent pressures in a wavy and reciprocating manner on the inner curvature of the sole with the thumb of the other hand.

This was performed for about 15 min for each foot. After ensuring the ability to perform foot reflexology, it was performed by patients' companions daily in the evening shift after the appointment time and at least 4 h after receiving the analgesic drug. This method was continued under the supervision of the researcher until discharge. After discharge, the patient underwent foot reflexology at home three times a week (every other day) for six weeks. Reflexology was performed by patients or their companions after discharge from the hospital at home. This method has been performed in other studies after educating patients and their companions (23-25).

In the gentle stretching exercises group, the patient was taught the exercises on the first day after surgery. Gentle stretching exercises include extension and flexion of the lower limb joints, as well as



**Figure 1. CONSORT Flow Chart of The Study**

contraction exercises of the muscles of the spine and gluteal region. These exercises were performed for half an hour a day in the evening shift after the appointment time and at least 4 h after receiving the analgesic drug, while the patient was standing or sitting on a chair.

In the hospital, gentle stretching exercises were performed under the supervision of the researcher until discharge. After discharge, the patient performed gentle stretching exercises at home three times a week (every other day) for six weeks. The control group only received routine care, which included prescribing analgesics and encouraging the patient to walk in the ward. In all three groups, the dose of used analgesics was measured and recorded in the relevant checklists during the patient's hospitalization and after discharge at home. A follow-up telephone call was performed once a week in order to ensure that the patient performed the intervention and recorded the severity of pain.

The patient's pain intensity was measured before and on the first and second days after the surgery, at the time of discharge, as well as one week and six weeks following discharge. The pain was assessed using a 10-point visual pain scale (VAS), which is a valid and reliable tool, 10 minutes after the intervention. On this scale, 0 is suggestive of "no pain" and 10 signifies the most severe pain (26). The VAS is a standard scale that has been widely used in various studies and its validity and reliability have been confirmed (27, 28). Firstly, the sample size of 79 subjects was determined using the Statistical Power Tables with an effect size of 0.32, an alpha level of 0.05 (1-tailed), and a power of 0.9; nonetheless, taking into account the sample attrition of 14%, the final sample size was increased to 90 cases (29).

The research plan was approved by the Vice-Chancellor for Research and the Ethics Committee of Mashhad University of Medical Sciences. Written informed consent was obtained from the participants in the study. Due to the normality and non-normality of the data, data analysis was performed in SPSS software (version 16) using chi-square, analysis of variance test, and analysis of variance with repeated measures. A p-value less than 5% was considered statistically significant.

## Results

The mean age score of participants was obtained at  $43.35 \pm 11.15$  years, and 51% of them were female. The subjects were homogeneous in terms of age, gender, weight, MBI, marital status, occupation, education, diagnosis, hospital type, the length of hospitalization, preoperative diagnosis, area and surgical incision size, as well as the instrumentation and duration of surgery, in all three groups. Some characteristics of research subjects are displayed in Table 1.

**Table 1. Demographic and medical characteristics of patients in the three groups**

Variable	Mean $\pm$ SD/frequency(percentage)			test result
	Foot reflexolog	stretching exercises	control	
Age (years)	45.33 $\pm$ 9.44	42.36 $\pm$ 11.93	42.36 $\pm$ 12.97	F=0.66 P=0.519
Body mass index (kg/m <sup>2</sup> )	27.23 $\pm$ 4.79	26.32 $\pm$ 5.20	27.13 $\pm$ 4.64	F=2.03 P=0.136
Surgical incision size	13.86 $\pm$ 5.96	15.60 $\pm$ 5.85	12.70 $\pm$ 4.61	F=2.10 P=0.128
Gender	male	16 (53.3)	15(50.0)	Chi=0.62 P=0.732
	Female	14 (46.7)	15(50.0)	
Job	unemployed and retired	16 (53.4)	19(63.3)	Chi=8.22 P=0.419
	Employee	10 (33.3)	4(13.4)	
	Free	4 (13.3)	7(23.3)	
Level of Education	Illiterate	7 (23.3)	8(26.7)	Chi=7.22 P=0.513
	Less than diploma	20 (66.7)	12(40.0)	
	Diploma and more	3 (10.0)	10 (33.3)	
Preoperative diagnosis	intervertebral disc herniation	10 (33.3)	7 (23.3)	Chi=1.34 P=0.510
	Displacement and spinal deformity	20 (66.7)	23 (76.7)	
Surgical area	thoracic	6 (20.0)	4(13.3)	Chi=2.53 P=0.282
	Lumbar	24 (80.0)	26 (86.7)	
Instrumentation	Yes	19 (63.3)	23 (76.6)	Chi=1.62 P=0.443
	No	11(36.7)	7 (23.3)	

**Table 2. Mean and standard deviation of analgesic dose in term of mg in patients undergoing spinal surgery during hospitalization, as well as one and six weeks after discharge in all three groups**

Time	Drug	Groups			Test result
		Foot reflexology	Stretching exercises	Control	
First day after the surgery	Apotel*	2978.26±779.39	3105.76±857.82	2909.77±899.23	F=0.33 P=0.717
	Morphine*	14.28±4.32	13.12±4.58	18.12±3.72	F=3.14 P=0.059
Second day after surgery	Apotel*	2900.00±867.54	2940.47±964.70	3000.00±602.07	F=0.07 P=0.927
	Morphine*	11.33±4.41	11.42±3.77	15.00±5.77	F=2.00 P=0.153
Discharge time	Simple Acetaminophen*	1421.42±385.62	1342.10±400.78	1411.95±335.73	F=0.26 P=0.766
	Acetaminophen codeine*	1888.88±220.47	1818.18±252.26	1714.28±267.26	F=0.99 P=0.385
First week after discharge	Simple Acetaminophen*	1417.52±384.71	1333.52±402.52	1406.52±326.64	F=0.30 P=0.743
	Acetaminophen codeine*	1888.80±220.48	1818.31±252.28	1750.03±273.84	F=0.58 P=0.567
Sixth week after discharge	Simple Acetaminophen*	1427.70±374.81	1452.57±426.18	1417.08±263.71	F=0.03 P=0.961
	Acetaminophen codeine*	1880.00±00.00	1452.53±426.12	1883.37±233.32	F=0.24 P=0.796

\*: mg

The mean scores of the dose of analgesics used by patients were measured on the first and second days after the surgery, the time of discharge, as well as the first and sixth weeks after discharge from the hospital. Analgesics and narcotics, such as Apotel and Morphine, were mainly administered by injection during hospitalization. Nevertheless, patients received oral analgesics, such as acetaminophen or codeine, upon and after discharge from the hospital. Analysis of variance illustrated no significant difference in the dose of analgesics used by patients during hospitalization, as well as the first and sixth weeks after discharge ( $P>0.05$ ) (Table2).

In the between-group comparison, analysis of variance test showed no significant difference in the mean pain intensity on the first day after surgery (before the intervention) between the three groups ( $P=0.191$ ). The mean of pain intensity in the reflexology group was lower than that in the stretching exercises group on the second day after surgery, discharge time, as well as first and sixth weeks after discharge ( $P<0.001$ ). However, there was no significant difference between the stretching exercise group and the control group ( $P<0.05$ ) (Table 3).

**Table 3. Mean and standard deviation of pain intensity in patients undergoing spine surgery at different time intervals during the study in three groups**

Time	Foot Reflexology	Stretching exercises	Control	
First day after surgery	7.00±1.25	6.46±1.19	6.80±0.92	F=1.68 , P=0.191
Second day after surgery	2.85±0.78	4.79±0.91	5.64±1.31	F=57.50, P<0.001
Discharge time	5.80±1.34	6.36±1.32	6.76±0.98	F=4.69 , P=0.012
First week after discharge	3.93±1.17	6.36±1.56	7.36±1.21	F=52.91, P<0.001
Sixth week after discharge	1.66±0.75	3.16±1.08	3.53±1.54	F=21.22 ,P<0.001
Test result	F=148.80 ; P<0.001	F=65.91; P<0.001	F=76.05; P<0.001	



In within-group comparison, the repeated measures analysis of variance demonstrated that the mean pain intensity was significantly decreased at the end of the sixth week, as compared to that in the first day after surgery in all three groups ( $P < 0.001$ ). Furthermore, in the foot reflexology group, compared to the stretching exercise group, the rate of pain reduction was higher at all time intervals after the intervention. There was no significant difference in the mean pain intensity in terms of the underlying variables of the study in patients undergoing spinal surgery. According to the results, none of the patients had any complications and complaints during the stretching exercises or foot reflexology.

## Discussion

The present study aimed to compare the effect of foot reflexology and gentle stretching exercises on pain intensity in patients after spine surgery. As evidenced by the obtained results, the mean pain intensity significantly reduced at the end of the sixth week, as compared to that on the first day after the surgery in all three groups. The amount of pain reduction in the foot reflexology group was greater than that in the stretching exercises group at all time intervals after the surgery. This signifies that reflexology has been more effective in the mitigation of pain intensity after spinal surgery, in comparison with gentle stretching exercises. Reflexology reduces pain by releasing endorphin which is a natural pain killer in response to reflexology and the body replies to accommodate all damage (30, 31).

Massage and reflexology are two techniques that may reduce pain by interrupting the transmission of pain signals, modifying pain perception, stimulating the release of endorphins and neurochemicals, as well as emotional regulation (32). The findings of the current research are in agreement with those reported by Dikmen et al. who assessed the effects of reflexology and progressive muscle relaxation exercises on pain, fatigue, and quality of life in patients with gynecological cancer (33).

In the stated study, the research subjects were randomly assigned to one of four groups: reflexology, progressive muscle relaxation exercises, reflexology with progressive muscle relaxation exercises, and the control group. The results illustrated a significant difference in the mean pain intensity in follow-ups at weeks 3, 8, and 12. At follow-up, the mean pain scores were significantly reduced in all groups, except the progressive muscle relaxation exercises group. The lowest mean pain score in the reflexology group was observed in the eighth week, indicating that reflexology interventions are more effective than progressive muscle relaxation exercises in pain management (33). Reflexology reduces postoperative pain and its effectiveness usually varies from a few days to a few weeks (14).

In a study by Rezvani et al., it was found that foot reflexology is effective in reducing the severity of pain in patients with chronic back pain referring to the physiotherapy ward (34). Along the same lines, in a clinical trial on the effect of foot reflexology on fatigue, pain, and sleep quality in patients with lymphoma, Rambod et al. pointed out that foot reflexology reduces fatigue and pain in patients and improves their sleep quality (31).

In another study, Dalal et al. (2014) pointed to the effectiveness of foot reflexology massage in the reduction of pain in patients with diabetic neuropathy (35). Ozdemir et al. indicated that foot reflexology reduced the severity of fatigue, pain, and muscle cramps in hemodialysis patients (36). Wang & Keck demonstrated that a 20-min massage of hands and feet reduces pain for 1-4 h after the surgery (37). Moreover, in several studies, the positive effects of foot reflexology as a low-cost, easy, and useful nursing intervention has been emphasized to manage and control the symptoms and problems of burn patients (38), eliminate some aspects of sexual dysfunction in male patients undergoing hemodialysis (39), reduce pain and fatigue, and improve the quality of life following chemotherapy in women with cancer (33).

In a study comparing the effects of foot reflexology and stretching exercises on the severity of restless legs syndrome in hemodialysis patients, Khojandi et al. found that both methods were equally effective in reducing the severity of restless legs syndrome (8). Sadeghi et al. also demonstrated that stretching exercises were effective in reducing pain intensity in patients with rheumatoid arthritis; nonetheless, foot reflexology had no effect on the reduction of pain intensity in these patients (19). These discrepancies between the aforementioned findings and the results of the present study can be ascribed to the different nature of the diseases, participants' characteristics, or the duration of the intervention. For instance, in the study by Sadeghi et al., the intervention was performed in a short period, in 30-min sessions three times a week for only four weeks.

In general, foot reflexology massage is a useful and non-invasive complementary treatment, and the majority of people who use this treatment feel a certain sense of relief (14). Since the effects of foot

reflexology massage and gentle stretching exercises on pain intensity after spinal surgery have been less studied, it is necessary to conduct more studies in this field. In the present research, patients' pain intensity was assessed using the visual pain scale, which is a subjective scale; consequently, patients' mentality in expressing the level of perceived perception can have affected the accuracy of the study. Although gentle stretching exercises were effective in reducing patients' pain intensity in the present study, more research is needed to confirm its effectiveness as an acceptable method in the reduction of patients' pain intensity after spinal surgery.

### Implications for Practice

As evidenced by the results of the present study, foot reflexology effectively reduces pain intensity in patients after spine surgery. Therefore, it is recommended to be used by patients or their companions as an appropriate care measure for the reduction of pain after spine surgery.

### Acknowledgments

This article was extracted from a thesis with a tracking code of 961594, the ethics committee code of IR.MUMS.REC.1397.084, and clinical trial code of IRCT20180404039194N1. The authors' deepest appreciation goes to the Vice-Chancellor for Research of University of Medical Sciences for the financial support of the present study, as well as all the patients and staff of the studied hospitals.

### Conflicts of Interest

The authors declare that they have no conflict of interest concerning the publication of the research.

### References

1. Khojandi S, Shahgholian N, Karimian J, Valiani M. Comparison the effect of two methods of reflexology massage and stretching exercises on the severity of restless leg syndrome among patients undergoing hemodialysis. *Iran J Nurs Res.* 2015;10(1):86-94.
2. Müslümanoğlu AY, Tayfun K. Türkiye Geleneksel ve Tamamlayıcı Tıp Merkezleri; Eğitim ve Uygulama İnovasyonu. *J Biotechnol Strateg Health Res.* 2019;3:1-12.
3. Deuel LM, Seeberger LC. Complementary therapies in Parkinson disease: a review of acupuncture, Tai Chi, Qi Gong, Yoga, and Cannabis. *Neurotherapeutics.* 2020;17:1434-55.
4. Gerbershagen HJ, Aduckathil S, van Wijck AJ, Peelen LM, Kalkman CJ, Meissner W. Pain intensity on the first day after surgery: a prospective cohort study comparing 179 surgical procedures. *Anesthesiology.* 2013;118(4):934-44.
5. Hussain A, Erdek M. Interventional pain management for failed back surgery syndrome. *Pain Pract.* 2014;14(1):64-78.
6. Chan C-w, Peng P. Failed back surgery syndrome. *Pain Med.* 2011;12(4):577-606.
7. Luo Z, Wang L, Sikorskii A, Wyatt G. Healthcare service utilization and work-related productivity in reflexology intervention for advanced breast cancer women. *Support Care Cancer.* 2019;27(8):2837-47.
8. Mirzaie P, Mohammad-Alizadeh-Charandabi S, Goljarian S, Mirghafourvand M, Hoseinie MB. The effect of foot reflexology massage on breast milk volume of mothers with premature infants: A randomized controlled trial. *Eur J Integr Med.* 2018;17:72-8.
9. Unlu A, Kirca O, Ozdogan M. Reflexology and cancer. *J Oncol Sci.* 2018;4(2):96-101.
10. Grove SK, Burns N, Gray J. *The practice of nursing research: Appraisal, synthesis, and generation of evidence: Elsevier Health Sciences; 2012.*
11. Uzan P. *Mind-Body Entanglement and Healing. Mind-Body Entanglement: Springer; 2022.*
12. Rambod M, Pasyar N, Shamsadini M. The effect of foot reflexology on fatigue, pain, and sleep quality in lymphoma patients: a clinical trial. *Eur J Oncol Nurs.* 2019;43:101678.
13. Buckley SJ. Executive summary of hormonal physiology of childbearing: evidence and implications for women, babies, and maternity care. *J Perinat Educ.* 2015;24(3):145-53.
14. Hall N. *Hand Reflexology for Practitioners: Reflex Areas, Conditions and Treatments: Singing Dragon; 2016.*
15. Rooney A. *Foot reflexology: principles and practice. Massage Therapy. E-Book: Principles and Practice; 2019. 241.*

16. Yaqi H, Nan J, Ying C, Xiaojun Z, Lijuan Z, Yulu W, et al. Foot reflexology in the management of functional constipation: a systematic review and meta-analysis. *Complement Ther Clinical Pract*. 2020;40(5):101198.
17. Karamisefat M, Cheraghi F, Soltanian A, Hasan Tehrani T. The effect of foot massage on pain of preschoolers undergoing venipuncture: a clinical trial. *Evid Based Care J*. 2021;10(4):49-58.
18. Shahgholian N, Jazi SK, Karimian J, Valiani M. The effects of two methods of reflexology and stretching exercises on the severity of restless leg syndrome among hemodialysis patients. *Iran J Nurs Midwifery Res*. 2016;21(3):219-24.
19. Sadeghi M, Zabolipour S, Afrasiabifar A, Najafi Doulatabad SH. Comparison of the effect of sole reflexology massage and stretching exercises on pain severity of patients with rheumatoid arthritis. *J Clinic Care Skill*. 2020;1(3):103-7.
20. Imani F, Nasiri E, Akbari H, Safdari MR. Effect of foot reflexology on postoperative pain in patients undergoing tibia plating surgery: a randomized Clinical Trial. *J Complementary Med Res*. 2020;10(3):258-69.
21. Hussain A, Erdek M. Interventional pain management for failed back surgery syndrome. *Pain Pract*. 2014;14(1):64-78.
22. Chan Cw, Peng P. Failed back surgery syndrome. *Pain Med*. 2011;12(4):577-606.
23. Luo Z, Wang L, Sikorskii A, Wyatt G. Healthcare service utilization and work-related productivity in reflexology intervention for advanced breast cancer women. *Support Care Cancer*. 2019;27(8):2837-47.
24. Mirzaie P, Mohammad-Alizadeh-Charandabi S, Goljarian S, Mirghafourvand M, Hoseinie MB. The effect of foot reflexology massage on breast milk volume of mothers with premature infants: A randomized controlled trial. *Eur J Integr Med*. 2018;17:72-8.
25. Unlu A, Kirca O, Ozdogan M. Reflexology and cancer. *J Oncol*. 2018;4(2):96-101.
26. Scott J, Huskisson EC. Vertical or horizontal visual analogue scales. *Ann Rheum Dis*. 1979;38(6):560.
27. Eqbali M. The effect of reflexology on pain in patients with chronic low back pain in nurses working in hospitals of Isfahan University of Medical Sciences: MA dissertation, Isfahan University of Medical Sciences; 2010.
28. Aure OF, Nilsen JH, Vasseljen O. Manual therapy and exercise therapy in patients with chronic low back pain: a randomized, controlled trial with 1-year follow-up. *Spine*. 2003;28(6):525-31.
29. Faul F, Erdfelder E, Lang AG, Buchner A. G\*Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behav Res Methods*. 2007;39(2):175-91.
30. Uzan P. Mind-Body Entanglement and Healing. *Mind-Body Entanglement*: Springer. 2022; 87-122.
31. Rambod M, Pasyar N, Shamsadini M. The effect of foot reflexology on fatigue, pain, and sleep quality in lymphoma patients: a clinical trial. *Eur J Oncol Nurs*. 2019;43:101678.
32. Buckley SJ. Executive summary of hormonal physiology of childbearing: evidence and implications for women, babies, and maternity care. *J Perinat Educ*. 2015;24(3):145-53.
33. Dikmen HA, Terzioglu F. Effects of reflexology and progressive muscle relaxation on pain, fatigue, and quality of life during chemotherapy in gynecologic cancer patients. *Pain Manag Nurs*. 2019;20(1):47-53.
34. Rezvani Amin M, Nikbakht R, Pournamdar Z. The effect of foot reflexology on pain intensity and disability of patients with chronic low back pain in physiotherapy unit of Baqiyatallah hospital. *Medsurg Nurs*. 2012;1(2):30-5.
35. Dalal K, Maran VB, Pandey RM, Tripathi M. Determination of efficacy of reflexology in managing patients with diabetic neuropathy: a randomized controlled clinical trial. *Evid Based Complement Alternat Med*. 2014;2014:843036.
36. Özdemir G, Ovayolu N, Ovayolu Ö. The effect of reflexology applied on haemodialysis patients with fatigue, pain and cramps. *Int Journal of Nursing Practice*. 2013;19(3):265-73.
37. Wang HL, Keck JF. Foot and hand massage as an intervention for postoperative pain. *Pain Manag Nurs*. 2004;5(2):59-65.
38. Davodabady F, Naseri-Salahshour V, Sajadi M, Mohtarami A, Rafiei F. Randomized controlled trial of the foot reflexology on pain and anxiety severity during dressing change in burn patients.



- Burns. 2021;47(1):215-21.
39. Zeidabadinejad S, Mangolian Shahrbabaki P, Dehghan M. Effect of foot reflexology on sexual function of patients under hemodialysis: a randomized parallel controlled clinical trial. *Evid Based Complement Alternat Med.* 2021;2021:8553549.