

Evaluation of the effect of reflexology massage on pain severity after abdominal surgery

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ABSTRACT

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Background: The pain caused by surgery is one of the major problems of the patients. Therefore, pain reduction through using noninvasive and simple methods is one of the nursing priorities. This study aimed to evaluate the effect of reflexology massage on pain intensity in the patients following the abdominal surgery.

Methods: This clinical trial was conducted on 90 patients undergoing abdominal surgery, referring to the Imam Khomeini Hospital in Tehran, Iran, in 2016. The participants were selected using the purposive sampling technique, and then randomly divided into three groups of 30 cases. The a 30-minute session of reflexology and simple massage were applied by the researcher for the first and second groups, respectively, after transferring the patients to the ward and regaining full consciousness. The pain was measured immediately, 10 min, and 24 h after the massage (30 min after the pre-test) using the visual analogue scale. The data analysis was performed in the SPSS version 19, using the one-way and repeated measures ANOVA as well as Chi-square test.

Results: According to the results of this study, 24 h after the intervention, the foot reflexology group had lower mean score of pain intensity (1.9 ± 1.6), compared to the simple massage (3.3 ± 1.64) and control groups (3.8 ± 0.2) ($P < 0.001$). The decrease in the pain score was significant between the groups only 10 min and 24 h after the intervention ($P < 0.001$).

Conclusion: As the findings of the present study indicated, the reflexology massage could alleviate the pain in the patients after abdominal surgery. Given the simple and non-invasive nature of this method, it could be used to reduce the pain in the patients along with other healthcare measures.

1. Introduction

The pain caused by the surgery has been the major problem of this therapeutic measure and is regarded as one of the nursing priorities.^{1, 2} The severity of the pain resulted from a surgery depends on the type of procedure; accordingly, the most severe type of pain is observed after chest, extensive orthopedic, and abdominal surgeries, respectively.³

The post-operative acute pain often lasts up to 24-48 h after surgery³ and is one of the worst pains one could experience. Higher severe pains result in less favorable hemodynamic and metabolic responses.⁴ If this type of pain is not controlled, it could lead to decreased flow of breathing, arterial

oxygen deficiency, increased respiratory infections, and higher risk of deep vein thrombosis. In addition, the unmanaged pain could result in the release of catecholamines, causing an increase in the heart rate and blood pressure, and also myocardial ischemia in susceptible patients.⁵ Therefore, an effective pain relief after the surgery accelerates the recovery, reduces the length of hospital stay, leads to the faster return to previous activities⁶, and decreases the associated costs.⁷

Various pharmaceutical techniques are recommended to decrease the post-operative pain;⁸ however, the complications associated with these medications on one hand and their temporary effectiveness on the other hand have led to the

evaluation of non-pharmacological methods in the past few years. One of the related interventions is pain reduction by alternative care methods or complementary medicine.⁹ One of the branches of complementary medicine is reflexology massage.¹⁰

Reflexology massage is a simple and non-invasive technique, which could be regarded as a part of nursing care.¹¹

This technique falls within the manual massage therapy group with the philosophy of changing the biophysics of the body by using a specific touch or pressure method on the reflexology points of the palms and soles.¹² The reflexology experts believe that these limbs are small maps of the whole body, and that all the similar organs are reflected on hands and feet in the same order they are observed in the body.¹³

In this regard, some studies have reported that the reflexology massage could decrease the pain in the patients following such operations as amputation,¹⁴ caesarian section,¹⁵ and breast surgery.¹⁶ Nevertheless, some studies have indicated no clear effect of reflexology massage on different conditions of patients, including pain.¹⁷⁻¹⁹

Currently, this method is not frequently used due to the nurses' shortness of time and conflicting results obtained by several studies regarding the positive impacts of reflexology massage. Given the doubts about the effectiveness of the complementary medicine among our community, one of the current major challenges in this regard is to enter these measures into the nursing tasks.²⁰ With this background in mind, this study aimed to evaluate the effectiveness of the foot (sole) reflexology massage on the patients' pain intensity following the abdominal surgery.

2. Methods

2.1. Design

This clinical trial was conducted on the patients undergoing abdominal surgery, who referred to the Imam Khomeini Hospital Complex in 2015 in Tehran, Iran.

2.2. Participants and setting

The sample size was estimated to be 25 individuals for the control group based on a study conducted by Sadeghi Shermeh *et al.* (2009)¹⁵ using the sample size formula ($Z_{1-\alpha/2}=1.96$, $Z_{\beta-1}=0.84$, $S=1.85$, $d=1.3$). On the other hand, 18 individuals were calculated for the intervention group using the " $n_3=n_2=\sqrt{2.2 \times n_1}$ " formula. Given the possible sample dropout, 90 cases were selected in total.

The participants were selected using the purposive sampling technique and divided into three

groups of intervention, placebo, and control through the random allocation method. To do so, A, B and C, which represented the reflexology massage, simple massage (placebo), and control, were written on separate papers and put inside a covered box. Afterwards, the patients were asked to take a piece of paper from the box. This continued until all groups were completed.

The inclusion criteria were: 1) male gender (due to gender similarity between the patients and the researcher), 2) undergoing abdominal surgery (e.g., laparotomy, cholecystectomy, and appendectomy) under general anesthesia, 3) age range of 15-60 years, 4) having healthy feet, especially the sole of the foot, 5) obtaining a minimum pain intensity score of ≥ 3 using the visual analogue scale (VAS) after the surgery and before the intervention, 6) full consciousness post-surgery, 7) lack of drug and alcohol addiction, 8) lack of sensory processing and movement disorders, 9) lack of any physical or mental disorders (with the exception of the recent surgery), 10) no history of foot reflexology massage, and 11) lack of chronic pain in other parts of the body (e.g., migraine and backache).

On the other hand, the exclusion criteria included touch sensitivity and inability to tolerate the massage of the required area. All the data related to the inclusion and exclusion criteria were collected through holding interviews and reviewing the participants' medical records.

2.3. Instruments

In this study, the data collection instruments were the VAS and demographic form, which contained such data as age, marital status, educational level, type of surgery, history of surgery, type of narcotic pain medication, and duration of surgery (min).

The reliability and validity of VAS was confirmed by Carlsson in 1983. This scale is a horizontal line ranging from 0 to 10, representing "no pain" and "worst possible pain", respectively. The patients marked their pain intensity on this line.¹⁹ The reliability of this tool has been evaluated in several studies.^{21, 22}

2.4. Data Collection

Post-surgery, when the patients regained their full consciousness, the inclusion criteria and preparedness of the patients for receiving the massage were assessed. Subsequently, the patients were allocated into one of the study groups (i.e., intervention, placebo, and control) with regard to the ethical considerations.

Prior to the study, the researcher passed a reflexology massage training course in an accredited

massage training center under the auspices of the Nursing Council and started the study after obtaining a valid certificate and receiving the confirmation of using accurate techniques by the experts in this field. The environmental variables were considered equal before the intervention in order to provide similar research conditions for all three study groups in the hospital. In this study, the first, second, and third groups received the reflexology foot massage, simple massage, and routine care of the ward, respectively.

The narcotic pain medications were administered for each group if required. The type of these medications were evaluated and recorded for each patient from the time of the physician's prescription to the beginning of the intervention using the information obtained from the nursing reports after the surgery. The reflexology massage therapy was applied for the first group by the researcher to relieve the pain. The intervention was performed while the patient, wearing comfortable clothes, was lying on his back with open hand palms facing upward and pillows under his head and knees. The researcher was required to cut his thumb and finger nails and take off his watch and ring. This reflexology massage was performed for 30 min (i.e., 15 min per foot) without using an ointment or moisturizer. In this technique, the solar plexus reflex point (the point in which the diaphragm and the digestive system routes are located) was used to reduce the pain. This point is in the border of the upper and middle one-third of the sole, along the second and third toes, where the foot wrinkle is formed when the sole bends²³ (Figure 1).

In the second group, the simple massage of the foot was applied to modify the mental state of the patients (placebo effect). This group received 30 min of massage similar to the foot massage in the points unrelated to the surgery. No intervention was carried out for the third group (control group). The pain intensity was evaluated in all the participants and recorded immediately before, immediately after (i.e., 30 min after pretest), as well as 10 min and 24 h following the intervention using the VAS.

2.5. Ethical considerations

To comply with all ethical considerations, this study was first approved by the Ethics Committee of the University of Social Welfare and Rehabilitation Sciences and the authorities of the selected hospital. In addition, the research objectives were explained face-to-face to the patients after regaining the full consciousness. Furthermore, the patients were ensured that they were allowed to withdraw from the study at any time without any effect on their treatment and hospitalization process. The

researcher was available throughout the study and responded to all the questions. Additionally, the participants' written informed consents were obtained.

2.6. Statistical analysis

The data analysis was performed using the descriptive statistics (mean and standard deviation), Chi-square test (to compare the demographic data including marital status, educational level, type of surgery, history of surgery, and type of narcotic medication), one-way ANOVA (to compare such variables as age, duration of surgery, and pain intensity among the three groups), and repeated measures ANOVA (to perform the intragroup comparison between the mean score of the pain intensity) through the SPSS version 19. The p-value less than 0.05 was considered statistically significant.

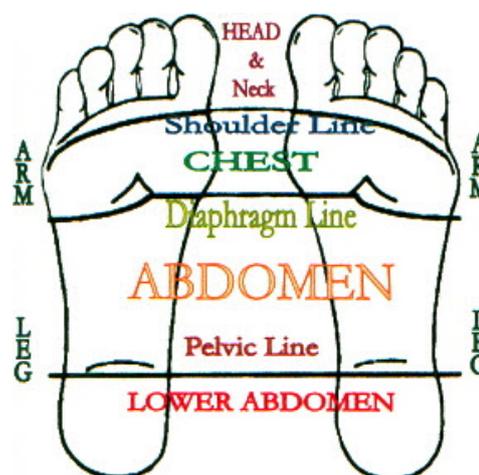


Figure 1. Reflexology points on the feet soles related to abdominal region

3. Results

The demographic characteristics of the participants are provided in Table 1, according to which no significant difference was observed between the intervention, placebo, and control groups in terms of the evaluated variables. Following the intervention, the mean score of pain severity decreased in all the study groups. In this regard, the reduction of mean pain score was higher in the intervention group after 24 h of intervention (1.1 ± 0.06), compared to the placebo (3.30 ± 1.64) and control (3.80 ± 2.02) groups ($P < 0.001$). This reduction was significant 10 min and 24 h after the intervention ($P < 0.001$).

The results of the post-hoc Tukey's test revealed no significant difference between the mean score of the control and placebo groups 10 min after the intervention ($P = 0.557$). However, a significant difference was found between the mean scores of

the control and intervention groups ($P < 0.001$) as well as between the placebo and intervention groups ($P < 0.001$). According to this test, no significant difference was observed between the mean pain score of the control and placebo groups ($P = 0.461$)

24 h after the test. Nevertheless, there was a significant difference between the control and intervention groups ($P < 0.001$) as well as between the placebo and intervention groups ($P = 0.004$) in this regard.

Table 1. Clinical and demographic characteristics of the participants

Groups Variables		Foot reflexology massage	Simple foot massage	Control	P-value
		N(%)	N(%)	N(%)	
Marital status	Single	7(23.3)	5(16.7)	6(20)	*0.811
	Married	23(76.7)	25(83.3)	24(80)	
Educational level	Illiterate	4(13.3)	5(16.7)	6(20)	*0.957
	Below high school diploma	11(36.7)	12(40)	11(36.7)	
Type of surgery	Above high school diploma	15(50)	13(43.3)	13(43.3)	*1.000
	Laparotomy	16(53.3)	16(53.3)	16(53.3)	
History of surgery	Cholecystectomy	8(26.7)	8(26.7)	8(26.7)	*1.000
	Appendectomy	6(20)	6(20)	6(20)	
Type of pain medication	Yes	13(43.3)	13(43.3)	13(43.3)	*0.181
	No	17(56.7)	17(56.7)	17(56.7)	
Age (year)	Apotel	1(3.3)	1(3.3)	3(10)	**0.990
	Morphine	11(36.7)	11(36.7)	8(26.7)	
	Methadone	8(26.7)	8(26.7)	3(10)	
	Pethidine	10(33.3)	6(20)	8(26.7)	
	Morphine and methadone	0(0.0)	3(10)	6(20)	
Duration of surgery (min)	Morphine and pethidine	0(0.0)	1(3.3)	2(6.6)	**0.647
	M±SD	43.30±14.14	43.10±15.46	42.77±14.84	
	M±SD	105.00±41.12	113.00±45.01	113.50±39.33	

*Chi-square test; **One-way ANOVA

Table 2. Comparison of mean pain severity in three groups before and after the intervention

Variables	Groups	Foot reflexology massage	Simple foot massage	Control	*P-value
		M±SD	M±SD	M±SD	
Pain	Before the intervention	7.37±1.73	6.73±1.76	6.67±1.80	0.244
	Immediately after the intervention	6.43±1.67	6.36±1.92	6.16±2.00	0.848
	10 min after the intervention	3.70±1.05	5.40±1.88	5.86±2.11	<0.001
	24 h after the intervention	1.90±1.06	3.30±1.64	3.80±2.02	<0.001
	**P-value	<0.001	<0.001	<0.001	

*One-way ANOVA; **Repeated measures ANOVA

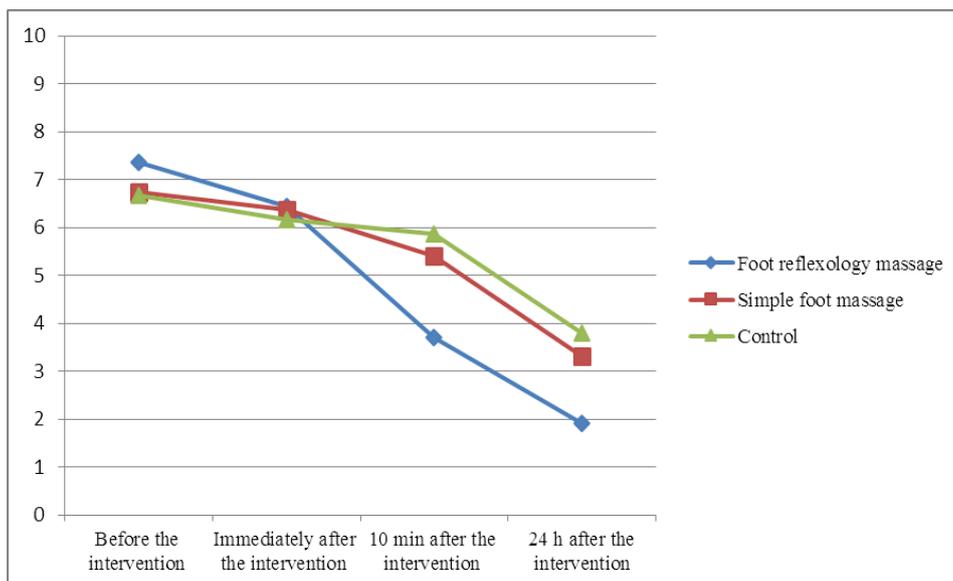


Diagram 1. Comparison of the reduction trend in three groups at different times

4. Discussion

According to the findings of the current study, although there was a progressive reduction in the pain intensity of all the study groups after the intervention, this decrease was more intense and quicker in the intervention group, compared to those in the placebo and control groups. Moreover, no significant difference was observed between the control and placebo groups regarding the pain intensity, which could be indicative of the true effectiveness of the reflexology massage therapy on the pain intensity of the patients.

Several studies have been conducted to evaluate the effect of the reflexology on pain reduction in various body parts. In this regard, Shahriari *et al.* (2016) reported that performing one session of reflexology massage therapy decreased the pain in the patients following amputation.¹⁴ In another study carried out by Sahbaei *et al.* (2014), it was demonstrated that the reflexology massage therapy on the second day of the spine surgery for four consecutive days significantly reduced the pain in the patients diagnosed with scoliosis.²⁴ Bagheri Nasami *et al.* (2012) expressed that a 20-minute reflexology massage of the left foot on the second day after the surgery for four consecutive days decreased the pain caused by coronary artery bypass grafting.²⁵ In addition, Kanan and Ucuzal (2014) reported the positive effects of foot reflexology massage on reduced pain after breast surgery in the patients with breast cancer.²⁶

The results obtained by Ebenezer and Samuel (2013) demonstrated that using a 45-minute session of foot reflexology massage increased the pain tolerance and threshold.²⁷ In addition, Ali and Taha (2011) reported the 8-week foot reflexology massage as a factor leading to pain reduction and improved quality of life in the patients diagnosed with rheumatoid arthritis.²⁸ In addition, Ozdemir *et al.* (2013) pointed out that three sessions of foot reflexology massage on a weekly basis reduced the fatigue, pain, and muscle cramp in the hemodialysis patients.²⁹

In spite of the differences between the present study and the aforementioned studies in terms of the type of disease, number of massage sessions, and type of surgery, their results are in congruence with our findings, which is indicative of the positive effects of this technique on pain reduction. The pain reduction after the administration of this method might be due to the stimulation of hundreds of nerve terminals of the feet sole caused by the pressure applied by the fingers on reflex points and the release of endorphin, which prevents pain transfer and results in relaxation and numbness, reducing tension, stress, and pain.²⁷ Nevertheless, some

studies have demonstrated that the foot reflexology massage cannot have a significant impact on all medical problems and conditions. Therefore, it is recommended that more studies be conducted to evaluate the effect of this type of massage in various clinical conditions and surgeries.^{17, 30, 31}

There is no comprehensive data on the basis of reflexology massage and what actually happens during this massage.³² Various studies have presented different reasons for the effectiveness of this technique.^{33, 34}

Given the fact that the pain is a multidimensional feeling (i.e., a combination of neurological, biochemical, cognitive, cultural, and environmental dimensions), it is perceived differently in each individual, which is a limitation.²⁸ One of the major drawbacks of this study was the anxiety caused by attending the massage sessions in the patients, which might have affected the final results. Nevertheless, the researcher attempted to create a sense of confidence and trust in the patients in order to reduce their anxiety. On the other hand, the current study was only performed on the male patients after abdominal surgery, which could limit the generalizability of the results. However, the entrance of female participants was not possible due to the ethical and legal terms. Another limitation of this study was the wide age range of the participants due to the limited duration of the intervention.

5. Conclusion

According to the results of the present study, the use of foot reflexology massage could effectively reduce the pain in the patients following an abdominal surgery. Therefore, regarding the non-invasiveness and simplicity of this technique, it could be used as a complementary treatment along with the pharmacological therapy to reduce the pain in the patients. Given the fact that pain is a mental response and could be different in the males and females, it is suggested that the effect of foot reflexology massage be investigated among the female patients as well.

Conflicts of interest

The authors declare no conflicts of interest.

Authors' contributions

Abolfazl Rahimi Zarchi: study design, research implementation, provision of the primary draft, Mohammad Ali Hosseini: participation in the supervision of the study implementation, final approval of the article, Hamid Reza Khankeh: participation in study design, implementation advisor, Reza Salman Roghani: participation in

study design, Akbar Biglarian: participation in study design, data analysis.

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