TURKISH JOURNAL of ONCOLOGY

Turk J Oncol 2023;38(2):228–37
doi: 10.5505/tjo.2023.3752

ORIGINAL ARTICLE

The Effect of Reflexology on Quality of Life in Colorectal Cancer Patients Suffering Chemotherapy-induced Neuropathy: A Randomized and Controlled Trial

Hesam GHOLAMZADEH,[1] Mahnaz ILKHANI,[1] Behnam ABEDINI,[1] Ahmad AMERI,[2] Nezhat SHAKERI,[3] Ali MOHAMMADABADI[4]

[1]Department of Medical Surgical Nursing, Shahid Beheshti University of Medical Sciences, Tehran-*Iran*
[2]Department of Radiation Oncology, Shahid Beheshti University of Medical Sciences, Tehran-*Iran*
[3]Department of Biostatistics, Shahid Beheshti University of Medical Sciences, Tehran-*Iran*
[4]Department of Medical Surgical Nursing, Tehran University of Medical Sciences, Tehran-*Iran*

OBJECTIVE

There is rare evidence of the effects of foot reflexology on quality of life (QoL) in patients with chemotherapy-induced neurotoxicity, this study aimed to determine the effects of foot reflexology on the QoL in colorectal cancer patients receiving neurotoxic chemotherapy.

METHODS

Eighty patients with chemotherapy-induced peripheral neuropathy Grade II-IV were randomly divided into two experimental and control groups (40 patients in each group). The experimental group participated in four reflexology sessions for 20 min once a week and the control group received only routine care and medical treatment as directed by a doctor. Data were collected using the sociodemographic characteristics form, EORTC QLQ-C30, and EORTC QLQ-CIPN20. Data were analyzed by SPSS version 25 using descriptive and inferential statistical methods.

RESULTS

A comparison of the difference between the mean total score of QoL before and after 4 weeks' reflexology sessions between the experimental and control groups revealed a significant statistical difference ($p<0.05$). The mean total score of QoL 4 weeks after the intervention was higher in the experimental group (48.3±19.5) than in the control group (26.2±15.2). With reflexology sessions, improvement of sensory ($p=0.01$), motor ($p=0.031$), and autonomic ($p=0.034$) function were more prominent in the experimental group.

CONCLUSION

The result of this study showed that foot reflexology relieved neurotoxicity associated with chemotherapy which improved the QoL in colorectal cancer patients. Hence, this low cost and easy procedure can be recommended as an effective technique.

Keywords: Colorectal cancer; neuropathy; nursing; quality of life, reflexology.

Received: August 14, 2022
Revised: October 04, 2022
Accepted: February 22, 2023
Online: March 10, 2023

Accessible online at:
www.onkder.org

Dr. Hesam GHOLAMZADEH
Department of Medical Surgical Nursing,
Shahid Beheshti University of Medical Sciences,
Tehran-Iran
E-mail: hegh1965@ymail.com

INTRODUCTION

Worldwide cancer prevalence is increasing.[1] Colorectal cancer is the third most common malignancy occurring worldwide and 3.5 million patients with colorectal cancer are receiving treatment.[2,3] Cancer can be treated by surgery, radiotherapy, chemotherapy, and targeted therapies.[4] The side effects of these treatments lead to lower quality of life (QoL); QoL is a multidimensional broad concept including physical, social, and spiritual welfare.[5] Fatigue, vomiting, diarrhea, skin changes, and peripheral neuropathy are common side effects experienced by cancer patients, which affect their QoL.[6]

Chemotherapy-induced peripheral neuropathy (CIPN) is a debilitating complication reported in 30–40% of patients receiving various chemotherapy agents.[7] Neuropathy is highly probable with some chemotherapy agents, such as taxane, platinum compound (Cisplatinum, Carboplatinum, Oxaliplatinum, etc.), vinca alkaloids, thalidomide, and their analogs.[8,9] The most common neuropathy symptoms include consistent burning pain, paresthesia, and feelings such as electric shock.[10] CIPN is usually dose-dependent.[11] The development of peripheral neuropathy may result in reduced prescription doses by physicians and this threatens cancer eradication.[12]

To adapt to chemotherapy complications, patients usually seek interventions that are available outside clinics; thus, complementary and alternative medicine are increasingly used to control chemotherapy side effects.[13–15]

Reflexology is a complementary therapy that works alongside conventional medical practices.[16] This approach is an old technique based on the fact that there are reflecting points on the palms and soles and applying pressure to these areas will help relax the nerves,[17] which will consequently reduce the tone of vessels and let blood and neural impulses flow more easily. Reflexology is based on stimulation of nerves and blood circulation in the body.[16,18,19]

In our comprehensive search, only one study was found to evaluate the effect of reflexology on the QoL in patients with CIPN; this study showed that reflexology reduced the symptoms of peripheral neuropathy.[6] The present study was performed with the aim of determining the effect of foot reflexology on the QoL among patients receiving neurotoxic chemotherapy in colorectal cancer cases.

MATERIALS AND METHODS

Trial Design

This randomized and controlled trial was conducted in the oncology ward of a teaching hospital in Tehran during April 2018–July 2018 on 80 patients undergoing neurotoxic chemotherapy in colorectal cancer cases.

Participants Inclusion and Exclusion Criteria

This study was a randomized and controlled trial on colorectal cancer patients who were experiencing chemotherapy-induced neuropathy.

The inclusion criteria were (a) patient's willing to participate in the study, (b) at least 18 years old, (c) all recruited participants had informed consent verbally explained and were provided a written informed consent sheet to be signed prior to participating in the study, (d) were able to communicate well enough to fill out the questionnaire, (e) colorectal cancer had been confirmed by a pathology report and oncologist's diagnosis and were undergoing chemotherapy treatment with neurotoxic agents, (f) have grades 2–4 CIPN, (g) did not have fractures, lesions, or vascular disorders such as deep-vein thrombosis, and (h) did not suffer spinal cord issues.

The exclusion criteria were (a) patients with neuropathy due to other causes, for example, diabetes, nerve compression injury and Charcot Marie Tooth Syndrome, (b) use of concomitant medications that could influence CIPN pain or one's overall sense of QoL, such as drugs like gabapentin or opioids, (c) any complication or disease of the lower limbs, any acute infectious disease during the study (Fig. 1).

Randomization

Patients fulfilling the inclusion criteria were selected through a continuous convenience sampling method and randomly divided into two groups of experimental (i.e., with foot reflexology) and control (i.e., without foot reflexology) groups using a table of random numbers. Both groups signed the form after the study objectives, methods, and informed consent was verbally explained to them (Fig. 1). In this trial, there was no possibility of complete blinding, but patients and outcome evaluators were not aware of the group assignment.

Data Collection Forms

A participants' sociodemographic characteristics form, EORTC QLQ-C30, and EORTC CIPN-20 were used to collect data about the Patients.

Turk J Oncol 2023;38(2):228–37
doi: 10.5505/tjo.2023.3752

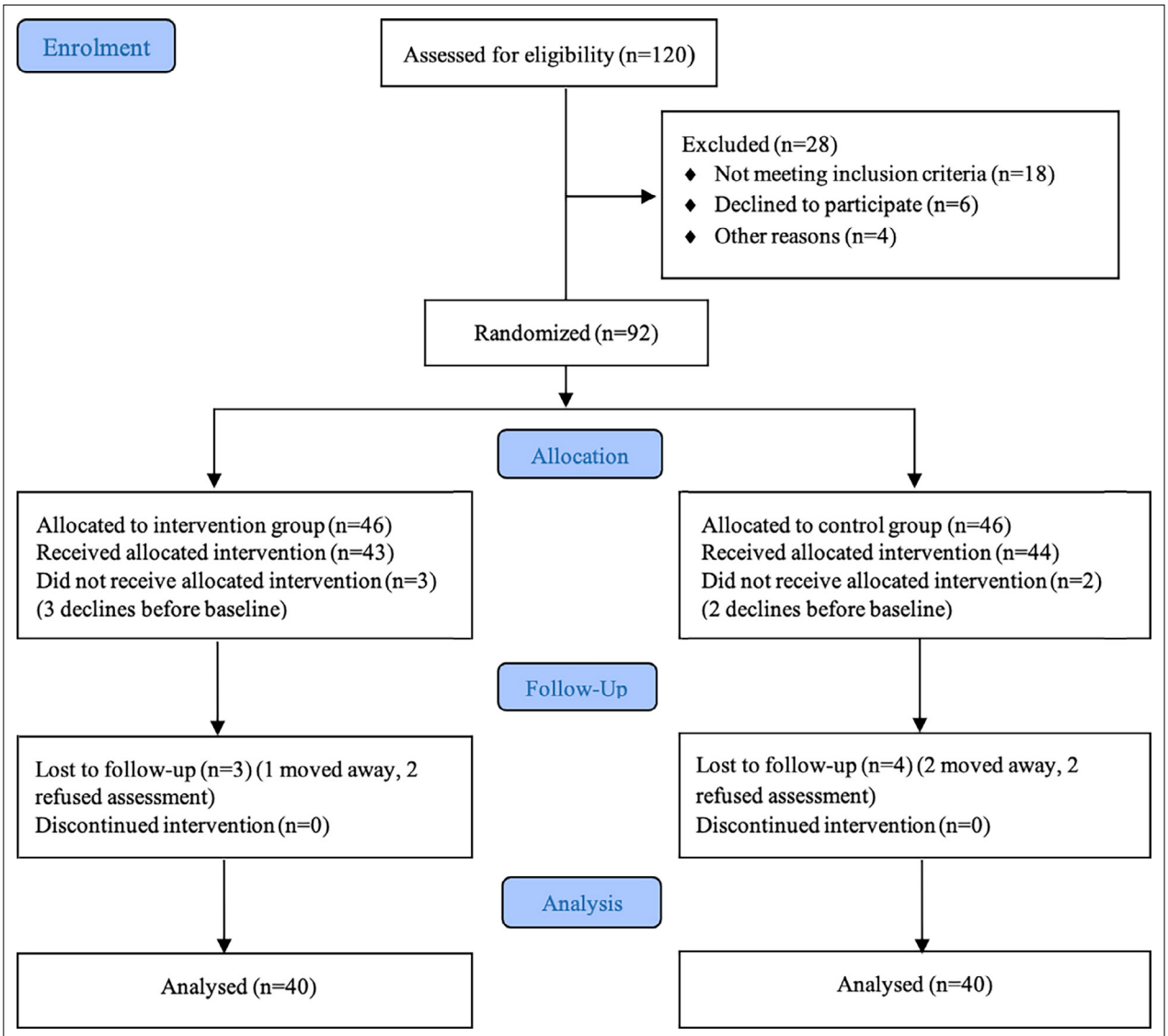

Fig. 1. Flow diagram.

Sociodemographic characteristics form: Which was prepared by the researcher in the light of the literature and involved questions about sociodemographic characteristics (Table 1).

NCI-CTCAE v4.0 Toxicity Criteria Form

ToXicity level

- Grade 1 Mild; asymptomatic or mild symptoms; clinical or diagnostic observations only; intervention not indicated.
- Grade 2 Moderate; minimal, local, or noninvasive intervention indicated; limiting age-appropriate instrumental activities of daily living.
- Grade 3 Severe or medically significant but not immediately life-threatening; hospitalization or prolongation of hospitalization indicated; disabling; limiting self-care activities of daily living.
- Grade 4 Life-threatening consequences; urgent intervention indicated.
- Grade 5 Death related to Adverse Event.

EORTC QLQ-C30 QoL scale (3rd version)

The European Organization for Research and Treatment of Cancer (EORTC), which is used to assess the QoL of cancer patients and consists of 30 questions evaluating QoL in three aspects (functions, symptoms, and common signs of cancer and its treatment, and general health condition).[20]

Table 1 Comparison of the participants' sociodemographic characteristics (n=80)

	Experimental (n=40)		Control (n=40)			
	$\bar{X}$	±SD	$\bar{X}$	±SD	t-test	p
Age	56.8	11.3	55.5	9.7	0.559	0.577
	n	%	n	%		
Gender						0.85*
Male	21	52.5	22	55		
Female	19	47.5	18	45		
Occupational status						0.916*
Employed	6	15	6	15		
Housewife	14	35	11	27.5		
Unemployed	3	7.5	5	12.5		
Self-employed	11	27.5	13	32.5		
Retired	6	15	5	12.5		
Marital status						0.713*
Married	28	70	25	62.5		
Single	6	15	7	17.5		
Widowed	1	2.5	2	5		
Divorced	5	12.5	6	15		
Educational level						0.878**
Illiterate	5	12.5	7	17.5		
Under the diploma	16	40	17	42.5		
Diploma	14	35	11	27.5		
Bachelor	4	10	3	7.5		
Master's degree and higher	1	2.5	2	5		
Stage of cancer						0.549**
1	1	2.5	2	5		
2	7	17.5	5	12.5		
3	2	50	18	45		
4	12	30	15	37.5		
Cancer detecting time						0.657**
Under one year	32	80	29	72.5		
One to two years	5	12.5	8	20.0		
Over two years	3	7.5	3	7.5		
Peripheral neuropathy grade						0.567**
Grade 2	31	77.5	29	72.5		
Grade 3	5	12.5	5	12.5		
Grade 4	4	10	6	15		
History of previous cancer						0.478*
Yes	12	30	15	37.5		
No	28	70	25	62.5		
Housing						0.284*
City	33	82.5	29	72.5		
Village	7	17.5	11	27.5		
Painkillers						0.650*
Yes (narcotic)	13	32.5	15	37.5		
Yes (non-narcotic)	19	47.5	20	50		
No	8	20	5	12.5		
Type of painkillers						0.987*
Injection	10	31.2	11	31.4		
Non-injection	22	68.8	24	68.6		

*: Chi square; **: Mann-Whitney. $\bar{X}$: Mean; SD: Standard deviation

Turk J Oncol 2023;38(2):228–37
doi: 10.5505/tjo.2023.3752

Fig. 2. Reflex points.

EORTC QLQ-CIPN20

European Organization for the Research and Treatment of Cancer QoL Questionnaire CIPN form, which includes 20 questions with three subscales for evaluation of sensory, motor, and autonomic symptoms.[20]

In all of these questionnaires, a four-point Likert scale was used: Not at All (a), A Little (b), Quite a Bit (c), and Very Much (d). The score for each aspect ranged from 0 to 100. Higher scores indicate a more normal condition for the patient in function and general health status and more severe symptoms in symptomatic aspects.[21] The EORTC QLQ-C30 questionnaire was evaluated by Safaei in 2007 to prove its validity and reliability, which revealed Cronbach's alpha to be above 0.7 for the questionnaire.[22] Moreover, the EORTC QLQ-CIPN20 questionnaire was assessed by Smith et al.[23] for validity and reliability, in which Cronbach's alpha was 0.88, 0.88, and 0.78 for sensory, motor, and autonomic scales respectively.

Nursing Intervention

In the experimental group, reflexology was applied to the patients after the pre-test was applied.

Reflexology Application: The experimental group participated in four reflexology sessions (once a week) for 1 month, according to the chemotherapy protocol, and received ten minutes of reflexology for each foot (20 min for each patient) during the administration of the chemotherapy in addition to the usual follow-up provided by the center. The control group only received only the usual follow-up by the center without foot reflexology. The post-tests forms were completed and gathered from the experimental and control groups after the fourth chemotherapy session. Reflexology care was provided by the researcher, who had received theoretical and practical training by participating in the reflexology course. In addition, certification was received from the Continuing Education Center of Shahid Beheshti University of Medical Sciences of Iran after completing the training for foot reflexology.

It is of note that the reflexology procedure was applied as follows: Based on methods used in previous studies,[6,24,25] the experimental group received four sessions of reflexology (relaxing techniques and massage of soles) for 20 min once a week; For this purpose, each patient was asked to lie down flat on the back, and the patient's legs were placed above the body with the feet elevated by putting a pillow underneath them so that the feet faced the researcher. After making the patient ready, the researcher oiled up the patient's feet with fragrance free massage oil and performed three relaxing massages on both feet. Beginning with the right foot, 5 min of foot warming movements were provided. The relaxing massage techniques included warming the patient's foot with the hands through special movements such as holding the patient's feet and passive movements to the joints that are applied such as flexion and external and internal rotation of feet. For stimulation of reflex points, the massage was applied on the cervical area, located at the medial edge of the foot, by finger with caterpillar movements, and pressure was applied on the brain area located under the big toe of both feet for 5–10 s (Fig. 2). The reflexology of the left foot was carried out using the same techniques after the end of the right foot treatment.

The authors were unable to find clear and consistent information regarding the reflex points for neuropathy that should be used for foot reflexology. However, since in the Kurt and Can study [6], reflexology was performed in the management of peripheral neuropathy in the cervical and brain areas of the foot, it was decided that in the present study, to use the stimulation of these areas (cervical and brain) in the experimental group.

Sample Size

To determine the sample size, the study used the mean and standard deviation scale scores that were selected according to the literature [17], we calculate a sample size of 40 patients per group, using the sample size formula and a two-sided 5% significant level, effect size of 0.7, a power of 80%, and anticipated a dropout rate of 30%. Sampling continued until the target sample size was reached.

Statistical Analysis

The collected data were processed using SPSS software ver. 25, and the final score for each aspect was calculated based on the EORTC QLQ-C30 and QLQ-CIPN20 questionnaires; the data were then analyzed using descriptive statistical tests such as mean, variance, and standard deviation and inferential statistical tests such as the Chi-square test, the Mann–Whitney test, and the independent t-test. The Chi-square, Mann–Whitney, and independent t-test were used for comparing sociodemographic data. Moreover, the independent t-test was used to compare the mean scores of QoL aspects in the experimental and control groups. A Cohen's d calculation was used to measure the difference between groups to determine the effect size. Cohen described an effect size of a small effect is 0.2, a moderate effect is 0.5 and a large effect size is 0.8.[26] $p<0.05$ was considered significant in this study.

RESULTS

Study Population and Characteristics

One hundred and twenty patients were invited to participate in this study; however, 18 patients did not meet the inclusion criteria, six patients declined to participate, and four patients were excluded from the study for other reasons. Thus, the patients were divided into two groups of 46 patients. During the study, some patients left the project due to failing to fill out the questionnaires (n=5), lack of desire to continue the reflexology sessions (n=4), being discharged from the hospital, or migration (n=3); thus, this study was carried out on 80 patients (40 patients in the experimental group and 40 patients in the control group). The data on the inclusion and exclusion of the study are presented in Figure 1.

The analysis of the patients' demographic information revealed that the average age in both the experimental and control groups was 56 years. Furthermore, 52.5% of patients in the experimental group and 55% of patients in the control group were men. About 82.5% of patients in the experimental group and 72.5% of patients in the control group were married and lived in towns. About 40% of patients in the experimental group and 42.5% of patients in the control group had a high school degree or lower. About 70% of patients in the experimental group and 42% of patients in the control group did not have a history of cancer among their first degree relatives and 50% of patients in the experimental group and 45% of patients in the control group were diagnosed with Stage III colorectal cancer; the experimental and control groups did not have statistically significant differences in demographic data (Table 1).

Score of the Total Size of the Subscale of QoL (EORTC-QLQ-C30)

In the pre-test, the independent t-test indicated that there were no significant differences between the two groups in terms of mean scores for aspects of QoL in the EORTC QLQ-C30 questionnaire ($p>0.05$). According to the comparison of the mean scores in different aspects of QoL in the experimental and control groups, mean scores in function scale in the experimental group at the end of the fourth session (76.8±14.3) were significantly higher than for the control group (61.5±16.01) ($p<0.001$). Mean scores in the symptom aspect in the experimental group at the end of the fourth session (29.6±8.5) were significantly lower than for the control group (47.8±14.9) ($p<0.001$); additionally, the mean overall QoL score at the end of the fourth reflexology session in the experimental and control groups was (48.3±19.5) and (26.2±15.2), respectively, which shows an increase in the experimental group and a decrease in the control group compared to before the intervention ($p<0.001$) (Table 2).

The mean scores of two aspects of QoL-function and general health improved in the experimental group, while the mean score of the symptom aspect was higher in the control group after intervention. Comparison of mean post-test scores in the experimental and control groups revealed statistically significant differences between them in terms of function aspect, symptom aspect, and general health status aspect ($p<0.001$). While chemotherapy symptoms were resolved in the experimental group, the symptoms of the control group worsened. The independent t-test showed that the mean total score for QoL of the patients in the experimental group who had received reflexology massages significantly increased after the intervention ($p<0.001$), while it did not show a significant difference in the control group ($p=0.916$).

Turk J Oncol 2023;38(2):228–37
doi: 10.5505/tjo.2023.3752

Table 2 Comparison of the mean pre-test and post-test scores in the experimental and control groups on the EORTC QLQ-C30 and Sub-dimensions

	First interview (before intervention)			Last Interview (after intervention)		
	$\bar{X}$	±SD	p*	$\bar{X}$	±SD	p*
Functional scales						
Experimental	65.05	16.5		76.8	14.3	
Control	68.1	18.6		61.5	16.1	
Effect size (d)**			0.441			<0.001
			0.17			1
Symptom scales/items						
Experimental	40.7	13.6		29.6	8.5	
Control	42.8	13.5		47.8	14.9	
Effect size (d)**			0.489			<0.001
			0.15			1.5
Global health status/QoL						
Experimental	28.3	17.3		48.3	19.5	
Control	27.9	17.8		26.2	15.2	
Effect size (d)**			0.916			<0.001
			0.02			1.26

*: Independent t-test; **: Cohen's d. EORTC QLQ-C30: European Organization for the Research and Treatment of Cancer Quality of Life Questionnaire; $\bar{X}$: Mean; SD: Standard deviation

Score of the Total Size of the Subscale of QoL (EORTC QLQ-CIPN20)

Similarly, in the aspect of QoL in the EORTC QLQ-CIPN20 questionnaire, the independent t-test in the pre-test showed no significant differences in terms of sensory, motor, or autonomic symptoms in either group (p>0.05). According to the comparison of the mean scores in different aspects of QoL in the EORTC QLQ-CIPN20 questionnaire for the experimental and control groups, mean scores in sensory scale for the experimental group at the end of the fourth session (26.1±11.1) were significantly lower than the control group (34.1±15.7) (p=0.01). Mean scores on the motor scale for the experimental group at the end of the fourth session (15.65±12.3) were significantly lower than for the control group (21.01±9.3) (p=0.031), and mean scores on the autonomic scale for the experimental group at the end of the fourth session (21.5±10.8) were significantly lower than for the control group (27.7±14.7) (p=0.034). The results showed that reflexology application was associated with positive effects in terms of improvement of sensory (p=0.01), motor (p=0.031), and autonomic symptoms (p=0.034) in the experimental group, which was most prominent for sensory symptoms (p=0.01) (Table 3).

DISCUSSION

Due to the fact that higher scores in general health status in the EORTC QLQ-C30 questionnaire indicate a higher QoL, it can be stated that reflexology enhanced the QoL of the patients in the experimental group. Since the experimental and control groups were not significantly different in terms of demographic information, this improvement in the QoL can be attributed to the intervention. The t-test showed a statistically significant difference in terms of the overall QoL score after the intervention (p<0.05). These findings are consistent with the study of Dikmen and Terzioglu,[27] whose study showed that Reflexology and Progressive Muscle Relaxation exercises are given to gynecologic cancer patients during chemotherapy were found to decrease pain and fatigue and increase the QoL.

In terms of the aspects of QoL measured by the EORTC QLQ-CIPN20 questionnaire, also, the results showed that sensory, motor, and autonomic symptoms improved even in the control group, but that the outcome for the experimental group was significantly better. The mean decreasing trend in the control group suggests that time is a key factor, and neuropathy requires the passing of time. However, this symptom improvement was more prominent in the experimental

Table 3 Comparison of the mean pre-test and post-test scores in the experimental and control groups on the CIPN and subdimensions

	First Interview (before intervention)			Last Interview (after intervention)		
	$\bar{X}$	±SD	p*	$\bar{X}$	±SD	p*
Sensory scale						
Experimental	41.3	8.9		26.1	11.1	
Control	40.1	9.02		34.1	15.7	
Effect size (d)**			0.713			0.01
			0.13			0.58
Motor scale						
Experimental	28.5	12.6		15.65	12.3	
Control	26.9	11.3		21.01	9.3	
Effect size (d)**			0.570			0.031
			0.13			0.49
Autonomic scale						
Experimental	30.5	15.5		21.5	10.8	
Control	31.9	15.5		27.7	14.7	
Effect size (d)**			0.691			0.034
			0.09			0.48

*: Independent t-test; **: Cohen's d. CIPN: Chemotherapy-induced peripheral neuropathy; $\bar{X}$: Mean; SD: Standard deviation

group, demonstrating the positive effects of reflexology on neuropathy recovery. Consequently, it can be stated that reflexology can lead to improvement of symptoms and QoL, and thus a faster return to daily life in patients with chemotherapy-induced neuropathy in colorectal cases. These findings are consistent with the results of Kurt and Can but cannot be generalized to an individual level.[6]

The present findings can be compared with a study conducted by Ozdelikara and Tan,[28] the researchers reported that reflexology had positive effects on the general health of patients with breast cancer undergoing chemotherapy. This method increased their function and had potential benefits because it reduced the complications of chemotherapy and the symptoms of the disease. According to the mentioned study, reflexology increased the QoL in patients suffering from breast cancer.

Similar results have been reported in studies utilizing other complementary therapies, for example in the Kurt and Can study,[6] reflexology was not found to be an effective way of managing patients' level of activity, walking ability, or other symptoms associated with motor and autonomic function associated with peripheral neuropathy due to chemotherapy. However, in the sensory management of patients with peripheral neuropathy, their results are consistent with the current study for improvement in sensory function. In addition, a study by Ben-Horin et al.[19] in 2017 showed that acupuncture and reflexology massage common protocol have the potential to aid recovery from peripheral neuropathy in breast cancer. In this regard, the results of the study by Uysal et al.[14] showed that reflexology is more beneficial for cancer patients than leg massage or no intervention. In another study by Ovayolu et al.[29] proved that aromatherapy, classic massage, and especially aromatherapy with aromatic oils increase the overall QoL score and improve the physical and mental symptoms caused by chemotherapy. Similarly, Tarrasch et al.,[30] studied the effects of reflexology on pain disorder, insomnia, and fatigue in patients with breast cancer during adjuvant radiotherapy and reported that reflexology can have positive effects on fatigue, sleep quality, pain, and QoL in breast cancer patients. Furthermore, Wyatt et al.,[24] conducted a study to evaluate the caregiver-delivered reflexology for symptom management during breast cancer treatment; the results of their study showed reflexology was effective in reducing the symptom severity in cancer patients and interaction with daily activities.

Reflexology has been assessed in many settings, which shows that reflexologists believe that this technique can be helpful in all these settings, though medics believe treatment should be evidence-based.[31] The results of some studies show that reflexology is not helpful for recovering from disease complica-

Turk J Oncol 2023;38(2):228–37
doi: 10.5505/tjo.2023.3752

tions or improving the QoL in cancer patients[7,32] which is inconsistent with the current study. This inconsistency may be attributed to the different types and duration of interventions, low sample size, or different types of communities.

Limitations of the Study

The Limitation in this study is the application of reflexology by the researcher. However, the researcher's adherence to ethical research norms eliminated any potential effects on the research findings; Only one cancer center was used to recruit patients; therefore, the findings are unrepresentative of the overall population; lack of follow-up of interventional effects can be considered as another limitation of this study, as it means the long-term effects of reflexology cannot be judged; in this study, patients filled out the questionnaires immediately after the 4th week, and it is suggested that the effect of reflexology massage be evaluated over longer periods (for example, six or 12 weeks) in the future studies to assess the long-term effects of this treatment; better documentation of the medications taken (dosage or frequency of medications for peripheral neuropathy) can enhance the validity of the results in the future studies. It is also recommended that future research use different research designs to explain the effects of therapeutic touch, personal contact, and other placebo effects.

CONCLUSION

The result of this study demonstrates that foot reflexology relieves the symptoms associated with QoL factors involved in patients receiving chemotherapy, due to a reduction in chemotherapy's adverse effects and disease symptoms. Consequently, it seems that this convenient and inexpensive intervention can be recommended to improve the well-being of this patient group.

Acknowledgments: This study is part of a master's thesis at Shahid Beheshti University of Medical Sciences. We would like to thank all patients that participated in this study, as well as the staff of Imam Hossein hospital in Tehran, for their cooperation.

Peer-review: Externally peer-reviewed.

Conflict of Interest: All authors declared no conflict of interest.

Ethics Committee Approval: The study was approved by the Shahid Beheshti University of Medical Sciences Faculty of Nursing and Midwifery Ethics Committee (no: IR.SBMU.PHNM.1396.773, date: 01/07/2017).

Financial Support: None declared.

Authorship contributions: Concept – H.G., M.I.; Design – H.G.; Supervision – A.A.; Funding – H.G., M.I.; Materials – A.A.; Data collection and/or processing – B.A.; Data analysis and/or interpretation – N.S.; Literature search – A.M.; Writing – B.A.; Critical review – H.G.

REFERENCES

1. Bao Y, Kong X, Yang L, Liu R, Shi Z, Li W, et al. Complementary and alternative medicine for cancer pain: an overview of systematic reviews. Evid Based Complement Alternat Med 2014;2014:170396.
2. Drury A, Payne S, Brady AM. Cancer survivorship: Advancing the concept in the context of colorectal cancer. Eur J Oncol Nurs 2017;29:135–47.
3. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2016. CA Cancer J Clin 2016;66(1):7–30.
4. De Oliveira SA, Borges R, dos Santos Rosa D, de Souza ACS, Seabra AB, Baino F, et al. Strategies for cancer treatment based on photonic nanomedicine. Materials 2021;14:1435.
5. Irmak Z, Tanrıverdi Ö, Ödemiş H, Uysal DD. Use of complementary and alternative medicine and quality of life of cancer patients who received chemotherapy in Turkey. Complement Ther Med 2019;44:143–50.
6. Kurt S, Can G. Reflexology in the management of chemotherapy induced peripheral neuropathy: A pilot randomized controlled trial. Eur J Oncol Nurs 2018;32:12–9.
7. Park R, Park C. Comparison of foot bathing and foot massage in chemotherapy-induced peripheral neuropathy. Cancer Nurs 2015;38(3):239–47.
8. Banach M, Juranek JK, Zygulska AL. Chemotherapy-induced neuropathies-a growing problem for patients and health care providers. Brain Behav 2016;7(1):e00558.
9. Ewertz M, Qvortrup C, Eckhoff L. Chemotherapy-induced peripheral neuropathy in patients treated with taxanes and platinum derivatives. Acta Oncol 2015;54(5):587–91.
10. Truini A, Cruccu G. How diagnostic tests help to disentangle the mechanisms underlying neuropathic pain symptoms in painful neuropathies. Pain 2016;157(Suppl 1):53–9.
11. Argyriou AA, Bruna J, Genazzani AA, Cavaletti G. Chemotherapy-induced peripheral neurotoxicity: management informed by pharmacogenetics. Nat Rev Neurol 2017;13(8):492–504.
12. Seretny M, Currie GL, Sena ES, Ramnarine S, Grant R, MacLeod MR, et al. Incidence, prevalence, and predictors of chemotherapy-induced peripheral neuropathy: A systematic review and meta-analysis. Pain 2014;155(12):2461–70.

13. Loquai C, Dechent D, Garzarolli M, Kaatz M, Kaehler KC, Kurschat P, et al. Use of complementary and alternative medicine: A multicenter cross-sectional study in 1089 melanoma patients. Eur J Cancer 2017;71:70–9.
14. Uysal N, Kutlutürkan S, Uğur I. Effects of foot massage applied in two different methods on symptom control in colorectal cancer patients: Randomised control trial. Int J Nurs Pract 2017;23(3):e12532.
15. Wode K, Henriksson R, Sharp L, Stoltenberg A, Hök Nordberg J. Cancer patients' use of complementary and alternative medicine in Sweden: a cross-sectional study. BMC Complement Altern Med 2019;19(1):62.
16. Gozuyesil E, Baser M. The effect of foot reflexology applied to women aged between 40 and 60 on vasomotor complaints and quality of life. Complement Ther Clin Pract 2016;24:78–85.
17. Razi PS, Haghighat S, Jarban M, Yekta ZP, Hosseini FA. The effect of reflexology on quality of life of breast cancer patients during chemotherapy. IJBD 20213;6(1):23–34.
18. Gholamzadeh H, Ilkhani M, Ameri A, Shakeri N. Effect of reflexology on the side effects of chemotherapy in cancer patients: an integrative review. Evidence Based Care Journal 2019;8(4):7–13.
19. Ben-Horin I, Kahan P, Ryvo L, Inbar M, Lev-Ari S, Geva R. Acupuncture and Reflexology for Chemotherapy-Induced Peripheral Neuropathy in Breast Cancer. Integr Cancer Ther 2017;16(3):258–62.
20. Aaronson NK, Ahmedzai S, Bergman B, Bullinger M, Cull A, Duez NJ, et al. The European Organization for Research and Treatment of Cancer QLQ-C30: a quality-of-life instrument for use in international clinical trials in oncology. J Natl Cancer Inst 1993;85(5):365–76.
21. Kieffer JM, Postma TJ, van de Poll-Franse L, Mols F, Heimans JJ, Cavaletti G, et al; CI-PeriNomS Group. Evaluation of the psychometric properties of the EORTC chemotherapy-induced peripheral neuropathy questionnaire (QLQ-CIPN20). Qual Life Res 2017;26(11):2999–3010.
22. Safaee A, Moghim Dehkordi B. Validation study of a quality of life (QOL) questionnaire for use in Iran. Asian Pac J Cancer Prev 2007;8(4):543–6.
23. Lavoie Smith EM, Barton DL, Qin R, Steen PD, Aaronson NK, Loprinzi CL. Assessing patient-reported peripheral neuropathy: the reliability and validity of the European Organization for Research and Treatment of Cancer QLQ-CIPN20 Questionnaire. Qual Life Res 2013;22(10):2787–99.
24. Wyatt G, Sikorskii A, Tesnjak I, Frambes D, Holmstrom A, Luo Z, et al. A randomized clinical trial of caregiver-delivered reflexology for symptom management during breast cancer treatment. J Pain Symptom Manage 2017;54(5):670–9.
25. Noh GO, Park KS. Effects of aroma self-foot reflexology on peripheral neuropathy, peripheral skin temperature, anxiety, and depression in gynaecologic cancer patients undergoing chemotherapy: A randomised controlled trial. Eur J Oncol Nurs 2019;42:82–9.
26. Cohen J. Statistical power analysis. Current Directions in Psychological Science 1992;1(3):98–101.
27. 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.
28. Özdelikara A, Tan M. The effect of reflexology on the quality of life with breast cancer patients. Complement Ther Clin Pract 2017;29:122–9.
29. Ovayolu O, Seviğ U, Ovayolu N, Sevinç A. The effect of aromatherapy and massage administered in different ways to women with breast cancer on their symptoms and quality of life. Int J Nurs Pract 2014;20(4):408–17.
30. Tarrasch R, Carmel-Neiderman NN, Ben-Ami S, Kaufman B, Pfeffer R, Ben-David M, et al. The effect of reflexology on the pain-insomnia-fatigue disturbance cluster of breast cancer patients during adjuvant radiation therapy. J Altern Complement Med 2018;24(1):62–8.
31. Ernst E, Posadzki P, Lee MS. Reflexology: an update of a systematic review of randomised clinical trials. Maturitas 2011;68(2):116–20.
32. Wanchai A, Armer JM. A systematic review association of reflexology in managing symptoms and side effects of breast cancer treatment. Complement Ther Clin Pract 2020;38:101074.