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The effect of foot reflexology on fatigue, pain, and sleep quality in lymphoma patients: A clinical trial

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ABSTRACT

Purpose: This study aimed to evaluate the effect of reflexology on fatigue, pain, and sleep quality in lymphoma patients.

Method: This study was a randomized clinical trial with pre-post design. Seventy-two lymphoma patients admitted in hematology wards affiliated to Shiraz University of Medical Sciences, Shiraz, Iran in 2018 were randomly assigned to intervention and control groups. Patients in the intervention group underwent foot reflexology for five consecutive days. The control group received usual care. The data were collected by the Multidimensional Fatigue Inventory, a numerical pain scale, and Pittsburgh Sleep Quality index. Data analysis was done by the SPSS software, version 21 using ANCOVA, paired *t*-test, and Wilcoxon test.

Results: At baseline, both intervention and control groups were the same in terms of fatigue, pain, and sleep quality ($p > 0.05$). However, a significant difference was found between the two groups regarding fatigue, pain, and sleep quality after the intervention (all $p < 0.05$).

Conclusion: The results showed that reflexology could reduce fatigue and pain and improve the quality of sleep in patients with lymphoma. Considering the effectiveness of reflexology in lymphoma patients, healthcare workers including nurses are recommended to use this complementary therapy to reduce fatigue and pain and improve sleep quality in lymphoma patients.

1. Introduction

Lymphoma is a neoplasm of cells of lymphoid origin, which is classified into two categories; i.e., Hodgkin and non-Hodgkin lymphoma (Hinkle and Cheever, 2018). Lymphoma as a kind of cancer and its treatments are associated with complications, such as mucositis (Mansouri et al., 2012, 2016; Rambod et al., 2018), sleep disturbance, depressed mood, and fatigue (Oerlemans et al., 2013; Wang et al., 2002).

Fatigue as a mental phenomenon decreases individuals' ability to work and participate in social and leisure activities and interrupts their relationships with their family members and others (Savina and Zaydiner, 2019). It was shown that a high proportion of non-Hodgkin lymphoma patients suffered from severe fatigue (Mounier et al., 2019). Indeed, compared to the normal population, non-Hodgkin lymphoma patients reported higher clinical fatigue (Oerlemans et al., 2013) and Hodgkin lymphoma ones suffered from fatigue more (de Lima et al., 2018).

Beside fatigue, approximately one-third of cancer patients reported moderate pain (Hamieh et al., 2018). Pain is a feared and debilitating symptom among cancer patients (Li et al., 2018). Pain and fatigue are directly associated with sleep disorder in hematology cancer patients (Miladinia et al., 2018). In other words, pain and emotional distress lead to poor sleep quality. It was revealed that pain was associated with excessive daytime sleepiness in Hodgkin lymphoma (Rach et al., 2017). Roughly half of lymphoma patients reported poor sleep quality and their Pittsburgh Sleep Quality Index (PSQI) score was 6.2, representing them as poor sleepers. Sleep quality, in turn, affected lymphoma patients' quality of life (Hammersen et al., 2017).

Pain, fatigue, and sleep disorders predicted cancer patients' quality of life (Miladinia et al., 2018). Therefore, conducting some safe interventions, such as Complementary and Integrative Health (CIH), might decrease these complications. For example, relaxation therapy reduced pain (Kwekkeboom et al., 2010; Rambod et al., 2014) and sleep disturbance (Rambod et al., 2013a) and improved adherence to treatment (Pasyar et al., 2015). Meditation as another CIH also reduced pain and

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sleep disturbance in cancer patients (Kwekkeboom et al., 2010). Some other kinds of CIH might reduce cancer-related fatigue (Mao et al., 2014; Pyszora et al., 2017; Sadja and Mills, 2013), pain, lack of appetite (Pyszora et al., 2017), sleep disturbance (Mao et al., 2014), depression (Mao et al., 2014; Pyszora et al., 2017), and anxiety (Mao et al., 2014) in cancer patients. Other CIH might decrease cancer-related fatigue (Courneya et al., 2012); Starreveld et al., 2018; Yeh and Chung, 2016), depression, and anxiety (Courneya et al., 2012) and improve global sleep quality (Courneya et al., 2012; Kaur et al., 2018), and quality of life (Pasyar et al., 2019) in cancer patients.

Although the United States National Cancer Institute (NCI) has supported CIH (Jia, 2012), these studies need more evidence-based practice. In addition, it has been reported that NCI spends roughly 120 million dollars each year to conduct research on prevention, treatment, symptom management, and epidemiology of cancer (Jia, 2012). This indicates the necessity to conduct studies on cancer patients, including those with lymphoma. Moreover, there are some questions about the effectiveness of these interventions in lymphoma patients because researchers believe that the conclusion about the effects of these CIH should be drawn with due caution (Sadja and Mills, 2013).

The present study has been focused on a kind of CIH named reflexology. In a previous study on reflexology, pressure was applied on particular points of the feet (Embong et al., 2017). Reflexology decreased cancer symptoms, such as nausea, vomiting, and fatigue (Ozdelikara and Tan, 2017), improved quality of life, and relieved dyspnea in cancer patients (Wyatt et al., 2012). Moreover, it could improve sleep quality in cancer patients (Tarrasch et al., 2018). Reflexology could be effective in chronic diseases, as well (Nazari et al., 2016). Reflexology refers to an intervention that is pressed on specific points of the hands and feet (Embong et al., 2015). Any compression on hands and feet acts as a sensor that is related to specific parts of the body (Hughes et al., 2011; Lu et al., 2011). By applying the reflexology technique, these sensors are stimulated to enhance blood circulation and energize, relax, and maintain homeostasis (Song et al., 2015a, 2015b). Foot reflexology could reduce tension and obstruction by stimulating the receptors on the foot as a result of expanding and dispersing the energy generated by the spinal cord into the nervous system (Torabi et al., 2012).

As mentioned above, reflexology could be accompanied with many benefits for patients. In chronic diseases, including chronic renal failure and cancer, this technique reduced fatigue (Roshanravan et al., 2016), improved sleep quality (Unal and Akpinar, 2016), and reduced neuropathy (Ben-Horin et al., 2017). Other studies suggested that reflexology was effective in reducing pain and fatigue (Bagheri-Nesami et al., 2012) and decreasing anxiety in patients after coronary artery bypass graft surgery (Mahmoudirad et al., 2014). Although reflexology was effective in chronic diseases, a review study by Ernst indicated no efficacy for reflexology (Ernst, 2009). Considering the controversial results of studies, high prevalence of fatigue, pain, and sleep quality impairment in patients with lymphoma, and lack of studies on the effect of reflexology in patients with lymphoma, this study aims to investigate the effect of foot reflexology on fatigue, pain, and sleep quality in patients with lymphoma.

2. Methods

2.1. Design

This was a randomized, controlled trial with a pre/posttest design and two groups (intervention and control). This study was conducted from October to December 2018 and was registered in the Iranian Registry of Clinical trials in 20/09/2018 (ID: 35916).

2.2. Setting

The study was conducted in three hematology and oncology wards in Nemazee Hospital affiliated to Shiraz University of Medical sciences, Shiraz, Iran.

2.3. Sample

The target population included patients diagnosed with lymphoma according to their records. The inclusion criteria of the study were aging ≥18 years, being able to understand and speak Persian, and being willing to participate in the study. Patients who consumed sleep medications and those with infectious or bleeding ulcers in their legs, intolerance to reflexology, physical disabilities, and known mental disorders that disabled them to perform self-care were excluded from the study. Patients with thyroid problems, epilepsy, diabetes, gout, or other circulatory problems of the feet were excluded, as well.

2.4. Randomization

Firstly, the patients were selected using convenience sampling. Then, block randomization with block size of four was used to randomly assign the patients to two groups. Block list was provided by the "Create a block randomization list" software. Each block was then placed inside an envelope and was numbered. In this way, after selecting a patient, a numbered envelope was opened according to which the patient was allocated to the intervention or the control group.

2.5. Sample size

Using a pilot study and based on power = 80%, $\alpha = 0.05$, mean scores of pain in the intervention and control groups = 2.6 and 4.9 respectively, and standard deviation = 3.4, the sample size for pain intensity was estimated to be 35 patients in each group (70 patients in total). Moreover, using that pilot study and considering power = 80%, $\alpha = 0.05$, mean scores of fatigue in the intervention and control groups = 58 and 66 respectively, and standard deviation = 12, the sample size for fatigue was calculated as 36 patients in each group (72 patients in total). In addition, considering the mean scores of sleep quality in the intervention and control groups = 8.5 and 11 respectively and standard deviation = 3.5, the sample size for sleep quality was estimated to be 31 patients in each group (62 patients in total). Therefore, the highest sample size (n = 72) was selected for the study.

At the beginning of the study, 84 patients were selected. Four patients did not meet the inclusion criteria, one of them had the exclusion criteria, two refused to participate, and five were not interested in participation. The remaining 72 patients were randomly assigned to the intervention and control groups. All patients completed the study and their data were analyzed (Fig. 1).

2.6. Blinding

In this study, the individual who evaluated the outcomes, the healthcare staff, and the statistician were blind to the study groups until data analysis was completed and the results were reported.

2.7. Intervention

In the intervention group, the patient laid on a bed in a quiet environment. Then, his/her legs and feet were elevated by about six inches using a pillow. A certified reflexologist sat next to the patient's feet and performed reflexology for 15 min on each foot.

The procedure of reflexology consisted of holding, pressing, sliding, gliding, stretching, and rotations. In order to do reflexology, firstly the reflexologist rubbed his hands together to warm them. Secondly, he warmed the patient's foot by rubbing it with his hands using sweet almond oil. When the foot was sufficiently warm, the reflexologist applied pressure on the thumb toe and solar plexus that were related to sleep and the inner and outer edges of the foot, the inner edge

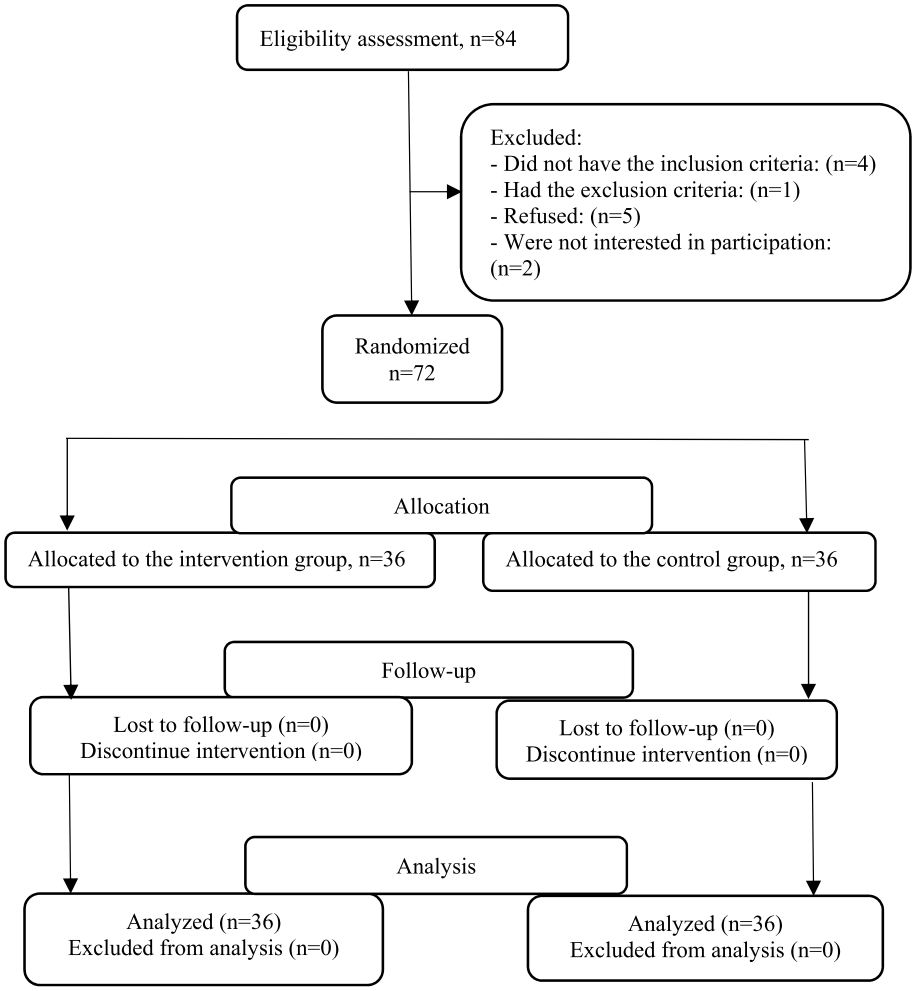

Fig. 1. Flow chart of the lymphoma patients who participated in this study.

of the sole, and heel of the ankle that were related to fatigue and back, scapula, hands, legs, and feet pain (Samuel, 2011).

In thumb toe reflexology, the medial edge and the top and base of the big toe were stimulated. The reflexology of solar plexus was pointed under the ball of the foot in the center. The inner edge of the foot that was related to cervical spine, thoracic spine, lumbar spine, and sacrum was also stimulated. Reflex points on the outer edge of the foot, such as legs/knees/lower back, elbows, arms, and shoulders, were stimulated, as well. Reflexology was also performed on the inner edge, sole, and heel of the ankle, which stimulated the sciatic nerve and lower back (Samuel, 2011). This was done at 4 p.m. over five consecutive days (Li et al., 2011).

Reflexology might have some side effects, such as swelling of the foot, frequent urination, bowel movement, and fatigue (Pauline, 1995). Therefore, the patients were provided with the cellphone number of one of the researchers to ask their questions in case of complications and side effects. However, the participants did not report any side effects or complications.

In the control group, the participants did not receive any type of massage. It should be noted that both groups received the routine care of the hospital.

2.8. Outcome measures

The outcomes of this study were pain intensity, fatigue, and sleep quality, which were measured at 3:30 p.m. before and five days after the intervention. The participants were evaluated at baseline and five days after the intervention by a researcher's assistant who was blind to the intervention and control groups.

2.9. Measures

Multidimensional Fatigue Inventory (MFI) was used to measure the participants' fatigue. This inventory contained 20 items scored through a 7-ponit scale. It covered five dimensions, namely general fatigue, physical fatigue, mental fatigue, reduced motivation, and reduced activity. The psychometric properties of this instrument were approved in cancer patients (Smets et al., 1995). Its construct and convergent validities were approved, as well. In addition, its Cronbach's alpha coefficient was 0.84 (smets et al., 1995). In the present study, the Cronbach's alpha coefficient of MFI was 0.75.

A numerical pain scale was used to assess pain intensity. In this 11-point numerical scale, numbers 0 and 10 represented “no pain” and “pain as bad as you can imagine”, respectively. This scale has been used in other studies, as well (Pasyar et al., 2018a; Rambod et al., 2014). The test-retest reliability of the numerical pain scale has been reported to be 0.94 (Rambod et al., 2014). This measure was found to be 0.95 in the present study.

PSQI was used to measure sleep habits. The items of this index were scored from 0 to 3. Thus, the total score of the index ranged from 0 to 21. The internal consistency of the Persian version of PSQI was approved by Cronbach's alpha = 0.83 (Rambod et al., 2013a). In this study, the Cronbach's alpha of the instrument was found to be 0.85.

2.10. Ethical considerations

This study was approved by the Ethics Committee of Shiraz University of Medical Sciences (Ethics Committee reference number: IR.SUMS.REC.1397.267, approval date: 20/06/2018). Written informed consent forms were signed by all participants. Accordingly, they were explained about the aims and length of the study as well as the intervention. Moreover, they were informed about the risks and benefits of the study. In addition, they were reassured that participation in the study was voluntary and the data would be published in general.

2.11. Data analysis

The data were analyzed using the SPSS software, version 20. Kolmogorov-Smirnov test revealed the normal distribution of pain and fatigue, but not sleep quality and its components. As administration of chemotherapy was a covariate in this study, ANCOVA was used to compare the study groups regarding the study variables. Moreover, paired *t*-test and Wilcoxon test were used to determine the mean difference of the variables before and after the intervention. $P < 0.05$ was considered to be statistically significant.

3. Results

3.1. Demographic and clinical characteristics

The mean age of the participants was 41.47 years (SD = 13.70) in the intervention group and 46.90 years (SD = 15.40) in the control group. Most of the participants in the intervention and control groups were male (69.4% vs. 75.0%) and married (77.8% vs. 88.9%). Besides, 38.9% of the patients in the intervention group and 44.4% of those in the control group had secondary and high school education levels. The majority of the patients had non-Hodgkin lymphoma (72.2% vs. 80.6%). Before the study, chemotherapy had not been started for approximately two-thirds of the patients in the intervention and control groups (77.8% vs. 69.4%). According to Table 1, the two groups were homogenous regarding the demographic and clinical characteristics.

The results of this study indicated no significant relationship between the administration of chemotherapy and fatigue (intervention group: F = 0.42, p = 0.65; control group: F = 1.23, p = 0.30), pain (intervention group: F = 0.89, p = 0.42; control group: F = 3.03, p = 0.06), and quality of sleep (intervention group: F = 2.84, p = 0.7; control group: F = 0.61, p = 0.54) at baseline.

Table 1
Demographic and clinical characteristic of the participants in the intervention and control groups.

Variables	Groups		Test[a], p-value
	Intervention n (%)	Control n (%)	
Gender			
Male	25 (69.4)	27 (75)	$\chi^2 = 0.27$
Female	11 (30.6)	9 (25)	P = 0.59
Education level			
Primary school	14 (38.9)	13 (36.1)	
Secondary and high school	14 (38.9)	16 (44.4)	$\chi^2 = 0.23$
Academic	8 (22.2)	7 (19.4)	P = 0.88
Marital status			
Single	8 (22.2)	4 (11.1)	$\chi^2 = 1.60$
Married	28 (77.8)	32 (88.9)	P = 0.20
Disease diagnosis			
Hodgkin lymphoma	7 (19.4)	10 (27.8)	$\chi^2 = 0.69$
Non-Hodgkin lymphoma	29 (80.6)	26 (72.2)	P = 0.40
Chemotherapy status			
Prior to chemotherapy	28 (77.8)	25 (69.4)	
Receiving chemotherapy	7 (19.4)	10 (27.8)	$\chi^2 = 0.69$
Post chemotherapy	1 (2.8)	1 (2.8)	P = 0.70

[a] Chi square.

Table 2
Comparison of the mean scores of pain intensity and fatigue and its components in the intervention and control groups before and after the intervention.

Variables	Groups		Test[a], p-value
	Intervention	Control	
Pain intensity			
Before	3.83 (2.79)	3.88 (3.46)	0.02, 0.87
After	2.72 (2.30)	4.33 (3.54)	6.41, 0.01
Test[b], p-value	4.08, < 0.001	−1.29, 0.20	
Multidimensional fatigue inventory			
Before	62.55 (11.27)	67.00 (12.70)	2.66, 0.10
After	53.41 (10.78)	68.88 (12.48)	16.10, < 0.001
Test[b], p-value			
Fatigue dimensions			
General fatigue	3.89, < 0.001	−1.76, 0.08	
Before	13.52 (3.37)	14.36 (3.39)	1.25, 0.26
After	12.30 (3.21)	14.33 (3.28)	7.97, 0.006
Test[b], p-value	3.08, 0.004	0.07, 0.94	
Physical fatigue			
Before	13.63 (3.48)	14.08 (4.01)	0.32, 0.57
After	12.88 (3.69)	14.91 (3.60)	6.37, 0.01
Test[b], p-value	1.80, 0.07	−2.45, 0.01	
Mental fatigue			
Before	10.94 (2.76)	11.30 (3.17)	0.28, 0.59
After	10.72 (2.45)	11.94 (3.07)	3.64, 0.06
Test[b], p-value	0.70, 0.48	−1.31, 0.19	
Reduced activity			
Before	14.88 (4.29)	15.80 (3.72)	1.12, 0.29
After	14.25 (3.36)	16.25 (3,37)	6.69, 0.01
Test[b], p-value	1.39, 0.17	−1.17, 0.24	
Reduced motivation			
Before	7.05 (2.30)	8.00 (2.60)	2.56, 0.11
After	6.72 (2.22)	7.83 (2.58)	3.73, 0.05
Test[b], p-value	1.35, 0.18	0.57, 0.56	

[a] ANCOVA, using chemotherapy as the covariate.
[b] Paired *t*-test.

3.2. Fatigue

According to Table 2, the results of ANCOVA showed no statistically significant difference between the two study groups with regard to MFI and its dimensions at baseline ($p > 0.05$). After the intervention, however, the results of ANCOVA showed a significant difference between the intervention and control groups regarding the mean scores of MFI and its dimensions, such as general and physical fatigue and reduced physical activity ($p < 0.05$). Nonetheless, there was no significant difference between the two groups with regard to the other dimensions of MFI, such as mental fatigue and reduced motivation, after the intervention ($p > 0.05$). In addition, the results of paired *t*-test showed a significant difference in the intervention group's mean difference of MFI and general fatigue scores before and after the intervention. The two groups' MFI scores before and after the intervention have been presented in Fig. 2.

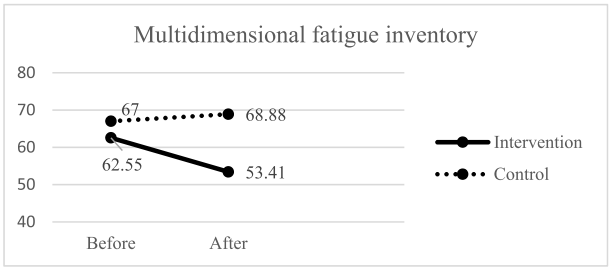

Fig. 2. The two groups' multidimensional fatigue inventory scores before and after the intervention.

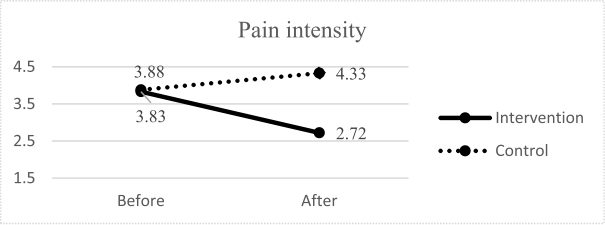

Fig. 3. The two groups' pain intensity scores before and after the intervention.

3.3. Pain intensity

Based on the results presented in Table 2 and Fig. 3, the results of ANCOVA showed no statistically significant differences between the two groups with regard to pain intensity before the intervention ($p = 0.87$). However, the results of ANCOVA indicated a significant difference between the two groups concerning the mean score of pain intensity after the intervention ($F = 6.41$, $p = 0.01$). Moreover, the results of paired *t*-test showed a significant difference in the intervention group's mean difference of pain intensity scores before and after the intervention ($t = 4.08$, $p < 0.001$).

3.4. Sleep quality

The results of ANCOVA revealed no statistically significant difference between the intervention and control groups regarding the total sleep quality and its components ($p > 0.05$), expect for sleep sufficiency ($p = 0.03$). Based on Table 3 and Fig. 4, the results of ANCOVA indicated a significant difference between the two groups concerning the total sleep quality after the intervention ($F = 21.79$, $p < 0.001$). A significant difference was also observed between the two groups regarding sleep latency, subjective sleep quality, sleep disturbance, and sleep sufficiency after the intervention ($p < 0.05$). However, no significant difference was found between the two groups with respect to the other components of sleep quality, such as sleep duration, daytime dysfunction, and sleep medication, after the intervention ($p > 0.05$). In addition, the results of Wilcoxon test indicated a significant difference in the intervention group's mean difference of total sleep quality and some of its components, such as subjective sleep quality, sleep latency, and sleep medication, before and after the intervention ($p < 0.05$).

4. Discussion

The present study results indicated that foot reflexology reduced fatigue in lymphoma patients. Consistently, it was reported that foot reflexology reduced fatigue in gynecologic cancer patients during chemotherapy (Dikmen and Terzioglu, 2019). Similarly, other researchers disclosed that reflexology decreased fatigue in breast cancer patients (Ozdelikara and Tan, 2017; Tarrasch et al., 2018). Reflexology released endorphins, enhanced the feeling of wellbeing and relaxation, improved blood flow and endothelial function (McCullough et al., 2014), and reduced stress and state anxiety (McVicar et al., 2007). Therefore, improvement of blood circulation and psychological aspects might have led to reduction of fatigue in lymphoma patients.

The study results showed that foot reflexology relieved pain intensity in lymphoma patients. Consistently, it was reported that foot reflexology reduced pain in cancer cystectomy patients (Silverdale et al., 2019). Similarly, other researchers indicated that massage therapy decreased pain intensity in chronic and acute conditions (Chunco, 2011; Pasyar et al., 2018a; Toth et al., 2013). Reflexology also reduced pain sensation, returned optimism, and caused re-engagement in usual activities (Whatley et al., 2018). It has been stated that endorphin as a body natural pain killer is released as a response to reflexology and the body learns to adapt with any injury (Embong et al., 2015).

Table 3
Comparison of the mean scores of sleep quality and its components in the intervention and control groups before and after the intervention.

Variables	Groups		Test[a], p-value
	Intervention	Control	
Total sleep quality			
Before	10.11 (3.26)	11.80 (3.83)	3.98, 0.05
After	8.41 (2.98)	11.83 (3.26)	21.79, < 0.001
Test[b], p-value	−3.55, < 0.001	−0.28, 0.77	
Subjective sleep quality			
Before	1.44 (.74)	1.63 (0.76)	1.29, 0.25
After	1.13 (.42)	1.69 (0.74)	15.50, < 0.001
Test[b], p-value	−2.59, 0.009	−0.57, 0.56	
Sleep latency			
Before	1.97 (0.99)	2.27 (0.74)	2.34, 0.13
After	1.58 (0.93)	2.30 (0.78)	12.13, 0.001
Test[b], p-value	−2.56, 0.01	−0.30, 0.76	
Sleep duration			
Before	2.11 (0.94)	2.44 (0.99)	1.88, 0.17
After	2.05 (0.82)	2.44 (0.87)	3.45, 0.06
Test[b], p-value	−0.90, 0.36	−0.13, 0.89	
Daytime dysfunction			
Before	1.30 (1.26)	1.75 (1.33)	2.09, 0.15
After	1.00 (1.19)	1.50 (1.29)	3.12, 0.08
Test[b], p-value	−1.72, 0.08	−1.91, 0.05	
Sleep disturbance			
Before	1.88 (0.57)	1.86 (0.72)	0.03, 0.84
After	1.44 (0.50)	1.80 (0.66)	6.67, 0.01
Test[b], p-value	−4.00, < 0.001	−0.70, 0.48	
Sleep medication			
Before	0.66 (1.26)	0.69 (1.26)	0.001, 0.98
After	0.58 (1.20)	0.63 (1.22)	0.01, 0.89
Test[b], p-value	−0.57, 0.56	−0.33, 0.73	
Sleep sufficiency			
Before	0.72 (1.11)	1.27 (1.20)	4.40, 0.03
After	0.52 (.84)	1.36 (1.22)	19.00[c], < 0.001
Test[b], p-value	−0.66, 0.50	−2.35, 0.01	

[a] ANCOVA, using chemotherapy as the covariate.
[b] Wilcoxon test.
[c] ANCOVA, subjective sleep quality and using chemotherapy were the covariates.

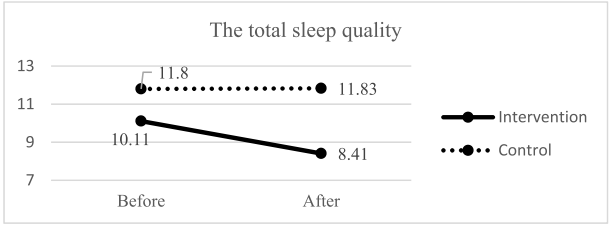

Fig. 4. The two groups' total sleep quality scores before and after the intervention.

The current study results showed that foot reflexology improved sleep quality in lymphoma patients. Reflexology also improved the quality of sleep in women with breast cancer (Tarrasch et al., 2018). Unal and Akpinar reported that foot reflexology improved the quality of sleep in chronic patients, such as those with renal failure under hemodialysis (Unal and Akpinar, 2016). Other researchers also indicated that the use of complementary and alternative therapies, including relaxation techniques, improved the quality of sleep and promoted the quality of mental sleep, delayed sleep, and daytime dysfunction in patients under hemodialysis. In the same vein, Pasyar et al. stated that foot massage was effective in improvement of patients' sleep quality post operatively (Pasyar et al., 2018b). Reflexology releases endorphin from the brain, which subsequently reduces pain, blood pressure, and heart rate. Moreover, reflexology can modulate the autonomic nervous system, reduce pain and stress (Hughes et al., 2011; McCullough et al., 2014), and improve sleep quality by decreasing the activities of the

sympathetic and neuroendocrine systems (Mohammad Aliha et al., 2013).

4.1. Limitations

This study had some limitations, including the short duration of the intervention as well as the short follow-up period. Hence, further long-term studies are suggested to be conducted on the issue. In order to improve the design validity, the crossover design is suggested. Moreover, a future study is recommended to be conducted on three groups, namely reflexology, control with standard care, and other kinds of CIH.

4.2. Implications for practice

Based on the study results, reflexology reduced fatigue and pain and improved sleep quality in lymphoma patients. Therefore, healthcare workers are recommended to make use of this easy and useful intervention. Future studies are suggested to assess the effects of reflexology on the psychosocial characteristics of lymphoma patients.

5. Conclusion

This study showed that reflexology reduced fatigue and pain and improved quality of sleep in lymphoma patients. For evidence-based practice, further studies are recommended to assess the effect of this intervention on these issues in lymphoma patients.

Declaration of competing interest

None declared.

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