



Effect of Reflexology in Treating Cancer Pain: A Meta-Analysis

Zhila Najafpour ^{1,*} and Kamran Shayanfard ²

¹Department of Health Care Management, School of Public Health, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

²University of Luxembourg, Luxembourg City, Luxembourg

*Corresponding author: Assistant Professor, Department of Health Care Management, School of Public Health, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran. Email: najafpour-zh@ajums.ac.ir

Received 2020 February 26; Revised 2020 May 20; Accepted 2020 May 23.

Abstract

Context: Pain is a common symptom associated with cancer and its treatment. The conventional treatment does not often relieve cancer pain optimally. The complementary therapies are increasingly used as adjunct therapy alongside pharmacological and conventional treatments in patients.

Objectives: The aim of this systematic review was to investigate the existing evidence for reflexology effect on cancer pain through a meta-analysis.

Data Sources: In this systematic review, electronic databases including MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials, and PubMed were searched to find relevant studies until December 2018.

Study Selection: We included before-after studies and trials of interventions that focused on pain management using reflexology modality as an intervention in patients with cancer regardless of cancer type. The effect of reflexology for patients with cancer pain was investigated as the main outcome.

Data Extraction: The extracted information included name of authors, year of publication, study location, type of study, sample size, and outcome indicator. Consensus was reached by discussion in case of disagreement during each stage of selection, qualitative assessment, and extraction of data. We assessed heterogeneity using the I² statistics. The publication bias was explored using the Egger's and the funnel plot. We meta-analyzed the data and reported the standardized mean difference (SMD) with 95% confidence intervals (CI) using the random-effects model. Meta-analysis was done using the Revman software.

Results: Eight studies with 948 participants were analyzed using a random-effects model meta-analysis. Included studies consisted of five randomized clinical trials, one quasi-experimental, and two pre-post design. We observed a positive effect for reflexology in patients with cancer pain compared with usual care (SMD- 0.55 [95% CI-0.82 to 0.21] P < 0.001).

Conclusions: This systematic review provides sufficient evidence for the effectiveness of reflexology as an effective treatment in cancer pain. But we recommend conducting studies with larger sample size, well-designed trials with sufficient duration and longer follow-up periods with clear details about reflex practitioners, duration of intervention, instrument for pain assessment, and outcome. Meanwhile, patients should be adequately monitored and adverse effects should be reported. All of the aforementioned issues might affect the impact of reflexology adjuvant treatment.

Keywords: Reflexology, Cancer, Pain, Meta-Analysis

1. Context

Pain is a common symptom associated with cancer and its treatment. Studies have reported that approximately 75% – 90% of patients with cancer experience pain during the course of illness. Pain management is one of the major challenges that need intervention in patients suffering from cancer (1).

Pharmacological support is the most common modality to cope with chronic and unbearable cancer pain. In addition, complementary and alternative medicines (CAMs) are increasingly used as adjunct therapy alongside pharmacological and conventional treatments. The comple-

mentary therapies include massage, aromatherapy reflexology, relaxation therapy, hypnotherapy, and acupuncture (2). Research has reported the use of CAM among patients with cancer between 7% to 64%.(3-7).

Among the CAM modalities, reflexology is one of the oldest and most popular palliative interventions which is easy to learn and perform and has no associated side effects so far. This method is increasingly popular in cancer palliation; a recent US survey of 4,139 cancer survivors suggested that 11.2% of them used one type of massage therapy (8). Reflexology is defined as a method of manipulating the soft tissue of whole body areas using pressure and traction

by hands or mechanical devices. Massage brings about a range of psychological and physiological changes including an improvement in blood and lymph flow, reduction in muscle tension, an increase in pain threshold, improvement in mood and mental state, reduction of blood pressure, and relaxation of the mind (9).

Evidence in support of massage for treating patients with cancer pain remains inconclusive. A few meta-analyses evaluating the effects of foot reflexology on cancer pain have been conducted; the present article is an attempt to update those.

2. Objectives

The objective of this systematic review was to accumulate and analyze the evidence from interventional studies on reflexology as an adjunct therapy in relieving cancer pain.

3. Data Sources

The electronic databases of MEDLINE, EMBASE, Cochrane, and PubMed were searched until 2018 using the keywords 'reflexology', 'massage therapy', 'zone therapy', 'complementary therapy', 'cancer', 'neoplasm', and 'Carcinoma' (see details in appendix 1 in supplementary file). All references of the systematic review articles obtained from the search results were reviewed by two authors (ZN, KS).

4. Study Selection

We included all randomized controlled trials (RCTs) or non-equivalent control groups or quasi-experimental and before-after studies that focused on pain management by reflexology modality as an intervention in patients with cancer regardless of cancer type.

The search results obtained from the selected databases were entered into the endnote software, duplicate studies were excluded, then the titles and abstracts were examined and irrelevant articles were removed based on inclusion criteria. Finally, the full texts of remained papers were reviewed for inclusion into the meta-analysis. Two authors (ZN, KS) performed all of the above steps individually.

5. Data Extraction and Quality Assessment

A datasheet was used to extract data. The extracted information included name of authors, year of publication,

study location, type of study, sample size, and outcome indicator. Consensus was reached by discussion with a third author in case of disagreement during each stage of selection, qualitative assessment, and extraction of data. The effect of reflexology for patients with cancer pain (treatment vs. usual care) was investigated as the main outcome.

Two authors (ZN, KS) conducted risk assessment of all the articles based on the criteria outlined in the Cochrane Handbook for Systematic Reviews of Interventions (10). The risk of bias for each item was rated as "low risk", "high risk" and "unclear" bias.

5.1. Data Synthesis and Analysis

The analysis was done based on Morris' study (11) who reported using an effect size based on the pooled pretest standard deviation (SD) compared with pooling SDs across both pretest and posttest scores, and also the pretest SD in the treatment and control groups is the best choice because it provides an unbiased estimate of the population effect size and has a known sampling variance. The standardized mean difference between the intervention and control groups was calculated for each study, based on the mean and pooled pretest SD, and the sample size in control and intervention groups. We pooled data across studies using a random-effect model. According to Cohen (12), effect size $d = 0.80$ and above was interpreted as a 'large-sized effect', $0.51 - 0.80$ was considered as a 'medium-sized effect', and $0.2 - 0.5$ was described as a 'small-sized effect'. The publication bias was explored by the funnel plot and heterogeneity was measured by the I^2 statistic. Results were expressed as mean difference with 95% confidence intervals (CI); P value less than 0.05 was considered statistically significant. Since included studies came from different settings, we performed a random effect model (13). Data were analyzed using the Revman software.

6. Results

6.1. Selection of Eligible Studies

We identified 4051 studies as potentially relevant. After screening the titles and abstracts 3968 studies were excluded and 44 studies and 27 systematic review articles in complementary medicine scope were fully evaluated. Finally, 10 articles were included that 8 articles (9, 14-20) - published from 1998 to 2018- were entered into the meta-analysis and other articles were reported narratively because of the defect in data (21, 22). The analyzed articles consisted of five randomized clinical trials, one quasi-experimental research, and two pre-post design studies. Data related to subjects, duration, frequency, and time per session for foot reflexology were extracted. The selection of

eligible studies was conducted based on the PRISMA flow diagram (Figure 1).

6.2. Quality Assessment

Between included studies, two studies were high-risk in randomization, three studies have preventive action for contamination bias, four articles have blinding in data gathering and one article was high-risk in basic characteristics and outcome measures (Figure 2).

6.3. Characteristics of Eligible Studies

Included studies were originated from the USA, Italy, Taiwan, Egypt, and Iran. Reflexology sessions typically lasted one to eight sessions and the minimum length of each session was 30 minutes. Intervention was done by reflexologists, trained staff, and nurses. Pain was assessed with visual analogue scales (VASs), the Brief Pain Inventory, Anderson Symptom Inventory, and PROMIS, but the most commonly used measurement tool was the VAS score (4 articles).

In this systematic review, eight articles had been included in the meta-analysis that had used reflexology as an intervention in cancer pain management (9, 14-20). Studies involved 30-256 participants with different cancer diagnoses (three studies had more than 100 participants). The average age of patients was 53.4 years in intervention and 52.3 in control group and most of the participants were female.

6.4. Meta-Analysis of Reflexology on Pain

The effect of reflexology in patients with cancer pain compared with usual care or placebo reflexology was significantly based on a random-effects model meta-analysis of data in eight articles (standardized mean difference (SMD) = -0.55 [95% CI = -0.96 to -0.15]). In sum, accumulated results of studies showed that reflexology has a large effect on cancer pain (see forest plot in Figure 3). Significant results in favour of the intervention with positive effects were reported in six articles (14, 16-20).

The results of the Egger's tests indicated evidence of publication bias among the studies ($P < 0.05$). The funnel plot confirmed these findings (Figure 4). Heterogeneity was measured by the I² statistic. The results showed a heterogeneity (I² = 87%, $P < 0.001$), however, we used the random-effect model.

None of the included studies reported any adverse effects associated with reflexology. We found a qualitative study reporting that healing crisis may be experienced after reflexology sessions. Followed by reflexology intervention, the participants reported symptoms with different severity including a mixture of pain, fatigue, and flu like

symptoms along with a variety of some other signs and it gradually became worse until the abrupt diminishing of symptoms around the seventh and eighth sessions of the intervention (23). Overall, reflexology can be considered as a safe procedure since it does not require any drugs or invasive intervention.

7. Discussion

The combined effect sizes and the 95% confidence intervals could be a proof of the effectiveness of reflexology in alleviating cancer pain. The current study has marked that reflexology effectively relieves cancer pain in all types of cancers included in the study.

Two systematic reviews with meta-analysis by Lee SH et al. (24) and Lee J et al. (25) have previously assessed the effect of reflexology in patients with cancer. The present study was an attempt to update those. Based on the last reviews, the evidence levels for the benefits of reflexology on cancer pain vary, Lee et al. indicated that massage is effective for the relief of cancer pain based on a meta-analysis of 4 studies specifically designed on the effect of reflexology (24) in diminishing pain in patients with cancer undergoing surgery. By conducting a meta-analysis, Lee et al. assessed the effect of reflexology, in general, and not specifically on cancer pain and indicated that foot reflexology is not a useful intervention to relieve pain (25). However, the combined effect sizes in this systematic review showed a considerable effect of foot reflexology on cancer pain. Reflexology diminished the level of pain in patients with cancer. In the current review, 5 out of 8 studies found significant positive effects in controlling cancer pain.

Also, the results of another systematic review without meta-analysis confirmed these findings. A review study by Ernst conducted on the effectiveness of reflexology for treating any medical condition for patients with diabetes, premenstrual syndrome, cancer, multiple sclerosis, symptomatic idiopathic detrusor or over-activity, and dementia suggested that reflexology had significant effects for patients with cancer pain. The review considered reflexology among massage therapy types (26). But, we performed a meta-analysis to investigate the only effect of reflexology in controlling pain in patients with cancer. Also, Wang's review evaluated the efficacy of reflexology in any condition in which five studies were included. They reported there is no evidence for any specific effect of reflexology in any conditions (27). Rueda's Review assessed the effect of reflexology in two articles that showed some beneficial, however short-lasting effects associated with reflexology (28). Myers et al. conducted a narrative review where they investigated five articles on reflexology and reported interventions ranged from a single 20-minute session of foot re-

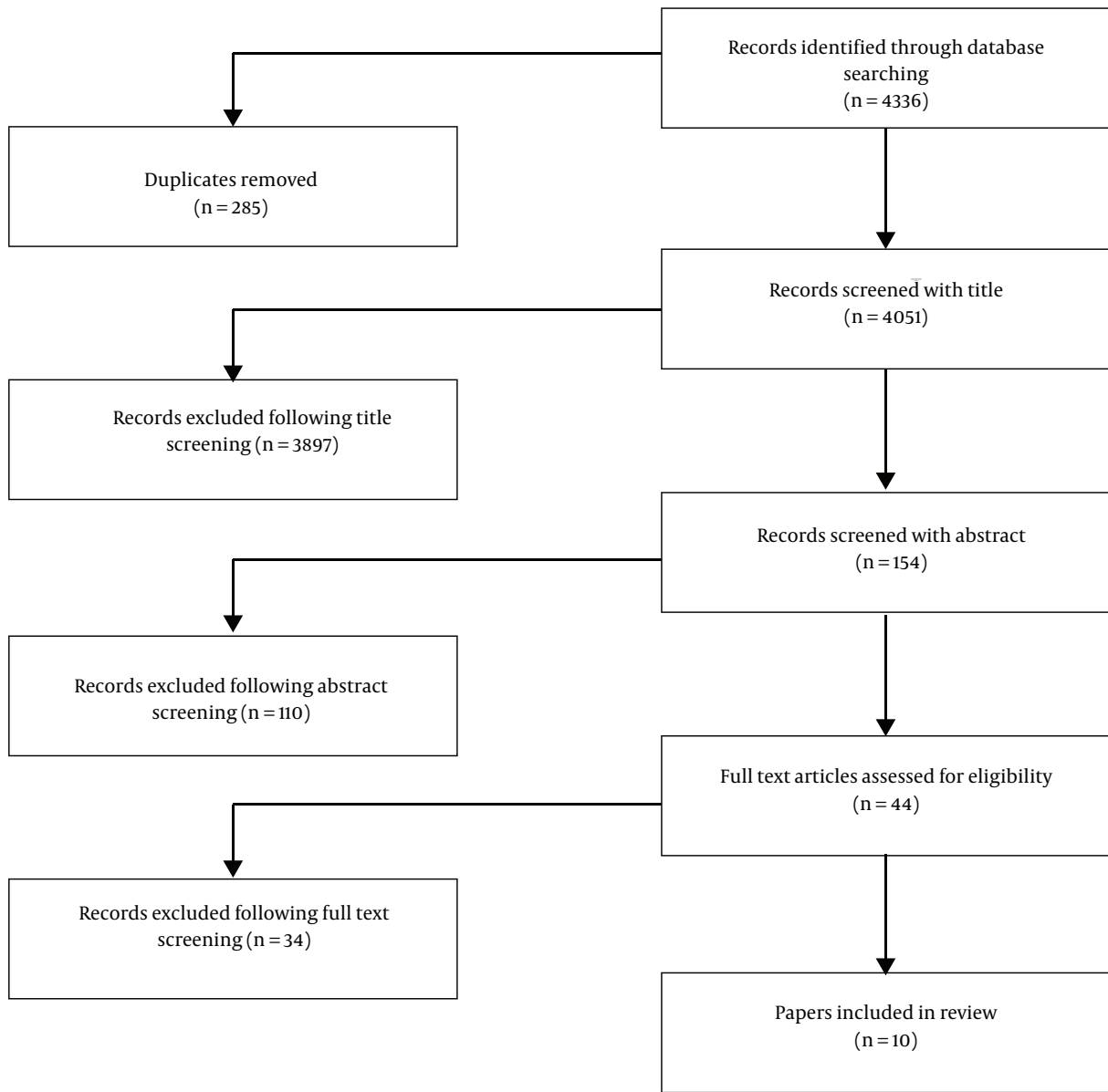


Figure 1. PRISMA flow diagram

flexology to six weekly sessions. Most of the articles have provided less details on reflexology protocols (29). It is clear that previous reviews have also had contradict in favor of reflexology as an effective intervention in cancer pain palliation.

Reflexology sessions typically lasted from a single 20-minute session of foot reflexology to six weekly sessions and were implemented by nursing students to certified reflexologists. Articles have offered details on reflexology protocols. The level of pain among patients was assessed

using visual analogue scales (VASs), the Brief Pain Inventory, Anderson Symptom Inventory, and PROMIS. According to Russell et al., the massage therapist may influence treatment effects (30). Therefore, assessing the aforementioned information in articles is vital.

8. Conclusion

In summary, we implemented a systematic review and meta-analysis to assess the effects of reflexology on pain re-

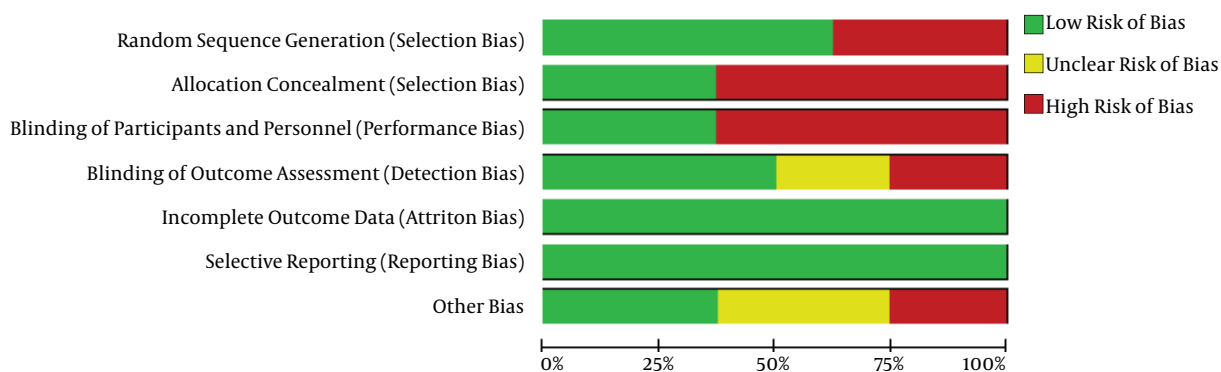


Figure 2. Quality assessment of included studies

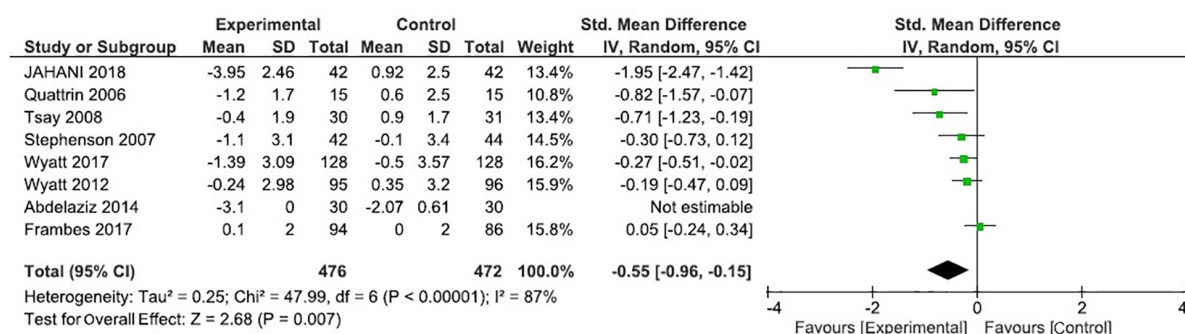


Figure 3. Forest plot of reflexology effect on pain for included studies

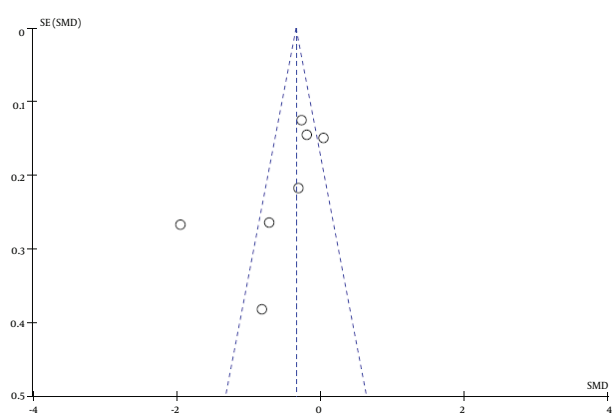


Figure 4. Funnel plot of reflexology effect on pain for included studies

lief in patients with cancer. We found sufficient evidence that reflexology has positive effects on diminishing pain among patients suffering from cancer and can be used

as a treatment for alleviating cancer pain. But it should be considered that the number of studies included in the present research was small with different levels of quality. So, we recommend that further studies be performed with larger sample size, well-designed trials with sufficient duration and longer follow-up periods with clear details about reflex practitioners, duration of intervention, instrument for pain assessment, and outcome. Meanwhile, patients should be adequately monitored and adverse effects should be reported. All of the aforementioned issues might influence the impact of reflexology as an adjuvant treatment.

8.1. Limitation

First, there is a potential list of missed studies in the present meta-analysis, including those published in languages other than English and study data that are not published in conventional journals (i.e. theses). However, we overviewed all recent systematic reviews to ensure that no trial in the English language was missed. Second, we faced

heterogeneity in the results and short term studies with small sample size or weakness in blinding and random assignment procedures that may be rigorously instituted having these in mind, the results should be interpreted with caution.

Supplementary Material

Supplementary material(s) is available [here](#) [To read supplementary materials, please refer to the journal website and open PDF/HTML].

Footnotes

Authors' Contribution: ZN, KS: Designing the methodology, reviewing of the literatures, and writing the article. ZN, KS: Assessing and analyzing article's data. All authors read and approved the final manuscript.

Conflict of Interests: The authors declare that they have no conflicts of interest.

Funding/Support: This project was supported by National Institute Health Research (NIHR) of Tehran University of Medical Sciences (TUMS). The funder had no role in the design of the study, data collection, analysis or interpretation of data, decision to publish or preparation of the manuscript.

References

1. Bruera E, Kim HN. Cancer pain. *Jama*. 2003;**290**(18):2476-9.
2. Macmillan Cancer Relief. *Directory of Complementary Therapy Services in UK Cancer Care: Public and Voluntary Sectors*. Macmillan Cancer Relief; 2002.
3. Ernst E. The prevalence of complementary/alternative medicine in cancer: a systematic review. *Cancer: Interdisciplinary International Journal of the American Cancer Society*. 1998;**83**(4):777-82.
4. Molassiotis A, Margulies A, Fernandez-Ortega P, Pud D, Panteli V, Bruyns I, et al. Complementary and alternative medicine use in patients with haematological malignancies in Europe. *Complementary Therapies in Clinical Practice*. 2005;**11**(2):105-10.
5. Chrystal K, Allan S, Forgeson G, Isaacs R. The use of complementary/alternative medicine by cancer patients in a New Zealand regional cancer treatment centre. *The New Zealand Medical Journal (Online)*. 2003;**116**(1168).
6. Leis A, Verhoef M, Deschamps M, Doll R, Tan L, Dewar R. What determines the use of complementary therapies by Canadian cancer patients? *Focus on Alternative and Complementary Therapies*. 2003;**8**(1):149-50.
7. Adams M, Jewell AP. The use of complementary and alternative medicine by cancer patients. *International Seminars in Surgical Oncology*. BioMed Central; 2007. 10 p.
8. Gansler T, Kaw C, Crammer C, Smith T. A population-based study of prevalence of complementary methods use by cancer survivors: A report from the American Cancer Society's studies of cancer survivors. *Cancer*. 2008;**113**(5):1048-57.
9. Wyatt G, Sikorskii A, Rahbar MH, Victorson D, You M. Health-related quality-of-life outcomes: a reflexology trial with patients with advanced-stage breast cancer. *Oncology nursing forum*. NIH Public Access; 2012. 568 p.
10. Higgins JP. *Cochrane handbook for systematic reviews of interventions version 5.0.1*. The Cochrane Collaboration; 2008.
11. Morris SB. Estimating effect sizes from pretest-posttest-control group designs. *Organizational research methods*. 2008;**11**(2):364-86.
12. Cohen J. *Statistical power analysis for the behavioral sciences*. Routledge; 2013.
13. DerSimonian R, Laird N. Meta-analysis in clinical trials. *Controlled clinical trials*. 1986;**7**(3):177-88.
14. Abdelaziz SHH, Mohammed HE. Effect of foot massage on postoperative pain and vital signs in breast cancer patient. *Journal of Nursing Education and Practice*. 2014;**4**(8):115.
15. Frambes D, Lehto R. Caregiver-Reported Health Outcomes: Effects of Providing Reflexology for Symptom Management to Women With Advanced Breast Cancer. *Oncology nursing forum*. Oncology Nursing Society; 2017. 596 p.
16. Jahani S, Salari F, Elahi N, Cheraghian B. The effect of reflexology in intensity of pain and anxiety among patients suffering from metastatic cancer in adults'hematology ward. *Asian J Pharm Clin Res*. 2018;**11**(6):401-5.
17. Quattrin R, Zanini A, Buchini S, Turello D, Annunziata MA, Vidotti C, et al. Use of reflexology foot massage to reduce anxiety in hospitalized cancer patients in chemotherapy treatment: methodology and outcomes. *Journal of Nursing Management*. 2006;**14**(2):96-105.
18. Stephenson NL, Swanson M, Dalton J, Keefe FJ, Engelke M. Partner-delivered reflexology: effects on cancer pain and anxiety. *Oncology nursing forum*. 2007.
19. Tsay S, Chen H, Chen S, Lin H, Lin K. Effects of reflexotherapy on acute postoperative pain and anxiety among patients with digestive cancer. *Cancer nursing*. 2008;**31**(2):109-15.
20. 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. *Journal of pain and symptom management*. 2017;**54**(5):670-9.
21. Hodgson H. Does reflexology impact on cancer patients' quality of life? *Nursing Standard (through 2013)*. 2000;**14**(31):33.
22. Stephenson NL, Weinrich SP, Tavakoli AS. The effects of foot reflexology on anxiety and pain in patients with breast and lung cancer. *Oncology Nursing Forum-Oncology Nursing Society*. [Pittsburgh, PA, etc.] Oncology Nursing Society; 2000. p. 67-76.
23. Gunnarsdottir TJ, Jonsdottir H. Healing crisis in reflexology: becoming worse before becoming better. *Complementary therapies in clinical practice*. 2010;**16**(4):239-43.
24. Lee S, Kim J, Yeo S, Kim S, Lim S. Meta-analysis of massage therapy on cancer pain. *Integrative cancer therapies*. 2015;**14**(4):297-304.
25. Lee J, Han M, Chung Y, Kim J, Choi J. Effects of foot reflexology on fatigue, sleep and pain: a systematic review and meta-analysis. *Journal of Korean Academy of Nursing*. 2011;**41**(6):821-33.
26. Ernst E. Is reflexology an effective intervention? A systematic review of randomised controlled trials. *Medical Journal of Australia*. 2009;**191**(5):263-6.
27. Wang M, Tsai P, Lee P, Chang W, Yang C. The efficacy of reflexology: systematic review. *Journal of advanced nursing*. 2008;**62**(5):512-20.
28. Rueda J, Solà I, Pascual A, Casacuberta MS. Non-invasive interventions for improving well-being and quality of life in patients with lung cancer. *Cochrane Database of Systematic Reviews*. 2011;(9).
29. Myers CD, Walton T, Bratsman L, Wilson J, Small B. Massage modalities and symptoms reported by cancer patients: narrative review. *Journal of the Society for Integrative Oncology*. 2008;**6**(1):19.
30. Russell NC, Sumler S, Beinhorn CM, Frenkel MA. Role of massage therapy in cancer care. *The Journal of Alternative and Complementary Medicine*. 2008;**14**(2):209-14.