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Foot Reflexology:

An intervention for pain and nausea among inpatients with cancer

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Abstract

BACKGROUND: Pain and nausea affect a significant number of patients with cancer. Applying foot reflexology to this population has had some positive effects, but more studies are needed to confirm its efficacy.

OBJECTIVES: The purpose of this study was to conduct a randomized controlled trial to evaluate the effects of foot reflexology on pain and nausea among inpatients with cancer as compared to traditional nursing care alone.

METHODS: A pilot study was conducted with adult patients with cancer hospitalized on a 24-bed inpatient oncology unit. Using convenience sampling, 40 patients provided consent and were randomized into either the intervention or control group. Each group had a treatment session of 20–25 minutes in which pre- and postsession surveys were completed, with reflexology performed in the intervention group only.

FINDINGS: Results show that foot reflexology significantly decreases pain for inpatients with cancer as compared to traditional nursing care alone. Although the effects on nausea are not statistically significant, they may be clinically relevant; the mean changes in pre- and postsession nausea ratings indicate at least some decreased nausea among patients in the intervention group.

Keywords

reflexology; integrative therapies; nausea; pain; symptom management; side effects

Hospitalized patients with cancer experience debilitating side effects from the treatment they are receiving for their disease and from the cancer itself. Unintended side effects of cancer treatment include nausea, vomiting, and fatigue (Özdelikara & Tan, 2017). Traditionally, options for addressing side effects have included a variety of medications. Patients with cancer may experience specific types of pain, including spasms, mucositis, bone pain, neuropathy, joint pain, and dermatitis (National Cancer Institute, 2021). However, nausea is another frequent symptom among patients with cancer, with chemotherapy-induced nausea

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and vomiting impairing emotional, cognitive, and social functioning. Chemotherapy-induced nausea and vomiting can lead to a decline in a patient's quality of life; nausea affects 40%–70% of patients during the course of their disease (Moradian & Howell, 2015; Özdelikara & Tan, 2017).

Integrative therapies have been shown to significantly decrease treatment-related cancer pain and associated anxiety in patients with cancer (Lee et al., 2015; Robison & Smith, 2016). For example, patients with breast cancer frequently use integrative therapies to relieve cancer-related symptoms in conjunction with conventional cancer care. Patients with cancer may use different integrative therapies (e.g., meditation, music, yoga, acupressure, acupuncture) to enhance wellness, quality of life, and symptom relief (Greenlee et al., 2017).

Reflexology, a less-studied integrative therapy, uses manual techniques to the feet or hands; manipulation corresponds to specific areas of the feet and stimulates neural pathways while supporting optional functioning of the body as a whole (Ball, 2016). There are two main types of reflexology: the Ingham method and the Rwo Shur method. Although the Ingham method uses only the hands for manipulation, the Rwo Shur method also uses tools (Embong et al., 2015).

Background

The American Reflexology Certification Board describes the difference between massage and reflexology as the intent of massage being a manipulation of the tissues used to relax muscles, whereas reflexology uses various techniques to support the overall health of the body's systems to function optimally (Ball, 2016). Robison and Smith (2016) found that patients with cancer receiving chemotherapy or biotherapy had decreased pain, fatigue, nausea, and anxiety following massage treatment on their hands and/or feet, supporting the effectiveness of massage. However, in a meta-analysis by Lee et al. (2015), reflexology on the feet appeared to be more effective than traditional massage for cancer pain.

Other systematic reviews have produced poor evidence for reflexology's effects on health conditions, including cancer-related symptoms. Unlu et al. (2018) compiled the findings of 18 reflexology studies (5 systematic reviews, 1 meta-analysis, 10 randomized controlled trials, 1 observational study, and 1 quasiexperimental study); symptoms varied and included urinary symptoms, pain, nausea, vomiting, stress, fatigue, depression, and anxiety. In a randomized controlled pilot study by de Oliveira et al. (2017), older adults with lower back pain in the control group received conventional foot massage, whereas the intervention group received foot reflexology. Results showed that the intervention group had a greater decrease in pain scores and para-sympathetic activity and an improved score on the Roland-Morris Disability Questionnaire, an important indicator of the benefits of reflexology compared to massage (de Oliveira et al., 2017).

Although there is limited evidence concerning the effects of reflexology on nausea in patients with cancer, a few trials have been conducted. In a double-blind randomized study conducted by Naseri-Salahshour et al. (2019), reflexology was performed on patients receiving hemodialysis in 30-minute sessions once a day for 12 days starting one hour

after hemodialysis began. The control group received a general foot massage and antinausea medication. Nausea and fatigue were significantly lower in the intervention group (Naseri-Salahshour et al., 2019).

The systematic review by Unlu et al. (2018) concluded that there is not enough evidence to support the reflexology theory of points on the foot corresponding to specific areas of the body. However, Unlu et al. (2018) reported various findings from clinical studies, including improvement in quality-of-life ratings in patients with breast cancer; decreased anxiety in patients with breast and lung cancer; and decreased pain and anxiety in inpatients with metastatic cancer and in postoperative patients with gastric and liver cancers. Likewise, Özdelikara and Tan (2017) reported positive outcomes with reflexology, but acknowledged various studies supporting the benefits of massage for decreasing nausea, vomiting, and fatigue in patients with cancer.

Despite research that has shown positive results in terms of pain and nausea in connection with reflexology, there are gaps. For example, few studies have focused on inpatients with cancer and reflexology. Fewer still have considered foot reflexology within the context of holistic nursing care. Reflexology is a modality that is easy to learn and that can be done almost anywhere, and there are few limitations for its utilization. However, the different methods of reflexology make it difficult to standardize and replicate (Embong et al., 2015). Other limitations may include training time and expense.

The purpose of the current study was to evaluate the impact of foot reflexology, administered by a nurse educated in this therapy, on pain and nausea among inpatients with cancer compared to traditional nursing care alone. Traditional nursing care is defined as standard care delivered by an RN and includes medication administration, assistance to ambulate, maintenance of IV lines, and patient education. If foot reflexology is found to be more effective for pain and nausea as compared to traditional nursing care alone, it may provide an important complement to nursing care and symptom management. It was hypothesized that patients with cancer receiving foot reflexology would experience greater relief of pain and nausea as compared to traditional nursing care alone.

Methods

A pilot study using a randomized quantitative design was conducted with adult patients with cancer who were hospitalized on a 24-bed inpatient oncology unit. Approval for the study was obtained from the institutional review board of St. Luke’s Health System in Idaho.

Sample and Setting

Using convenience sampling, hospitalized patients with cancer were recruited until 40 participants had provided consent and completed the study requirements. Power analysis indicated that with a sample size of 40 (20 per group [intervention and control]) and an alpha set at 0.05, a large effect size (0.9), which was estimated to be a clinically relevant reduction in pain and/or nausea, would be detectible with 80% power. Data were collected from November 2016 to November 2018. Patients were randomized to receive reflexology in addition to traditional nursing care or traditional nursing care alone.

This oncology unit, in a 430-bed inpatient hospital setting, provides treatment to patients with diverse types of cancer at varying stages of treatment. Patients may be undergoing treatment during their stay or are being treated for side effects of treatment, such as intractable pain and nausea. This unit provides treatment for patients with hematologic cancers and solid tumors, as well as for patients who have undergone surgery for gynecologic cancers; it also provides medical-surgical overflow. Inclusion criteria for this study were as follows:

- Admission under an oncologist's care
- Aged 18 years or older
- Ability to speak and read English
- Ability to provide informed consent and understand the pre- and postsession surveys
- Willingness and ability to complete a reflexology session of 20–25 minutes without receiving medication, including that intended for pain and nausea
- Platelet count of 50,000 platelets per mcl or greater or approval by attending healthcare provider
- Current pain and/or nausea

Exclusion criteria for this study were as follows:

- Use of patient-controlled analgesia pump
- Gynecologic surgery during the current admission
- Open wounds on one or both feet
- Recent surgery on one or both feet
- Acute injury on one or both feet
- Known blood clot in either lower extremity

Informed Consent and Data Collection

A one-page flyer with study highlights was distributed to patients with cancer by a nurse or social worker and displayed in public areas around the unit. The principal investigator (PI), K.D.A., an RN educated and trained in reflexology, conducted rounds with patients to assess for questions about the study. Following screening for study eligibility, consent was obtained from patients by the PI in a private room; patients were then assigned to study condition (i.e., reflexology and traditional nursing care versus traditional nursing care alone) by random drawing. Consent allowed for access to each participant's electronic health record, which the PI accessed to confirm screening question answers. At the time of the study, the PI had completed 152 reflexology classroom hours at the Seattle Reflexology and Massage Center in Washington and more than 50 practice hours.

For participants assigned to the group receiving reflexology, the PI scheduled a 20- to 25-minute session for reflexology administration. Those in the control group also participated

in a 20- to 25-minute session during which the PI administered surveys but no reflexology. At the beginning of the session, participants were provided with a copy of the visual analog scale (VAS) and instructed on how to complete it for pain and nausea. The VAS was chosen because it has been shown to be a reliable tool to measure chronic and acute pain (Bijur et al., 2001). In addition, various studies involving patients with cancer have established the validity of the VAS for rating nausea and vomiting severity (Meek et al., 2009). The Wong-Baker FACES® Pain Rating Scale was chosen for this study, with permission obtained from its authors. It is a scale ranging from 0 (no pain) to 10 (worst pain possible), with pain intensity descriptors and visuals of faces depicting pain severity. The VAS used for nausea ranges from 0 (no nausea) to 10 (worst nausea possible).

Participants were given an electronic or paper survey, depending on preferences and iPad availability, to record nausea and pain prior to the session. Demographic information and questions related to cancer diagnosis were included. Immediately following the study visit, a nausea and pain survey was administered. Number of minutes since last pain and/or nausea medication administration was assessed directly from the electronic health record. After the postsession survey was completed, control group participants were offered a complimentary reflexology session.

Reflexology Session

A foot reflexology session, using light to medium touch, was performed by the PI on participants in the intervention group in a private hospital room. To minimize interruptions, a “therapy in progress” sign was placed on the door. Reflexology techniques were adopted from the Ingham method and included thumb and finger walking, hooking in and backing up, and rotation on the point. The session focused on overall balance and relaxation while working all systems of the body reflexively. A timed sequence was performed on patients using the techniques on the following reflexes: solar plexus, diaphragm/chest/lungs, esophagus, thyroid/helper to thyroid, pituitary gland, stomach, liver, adrenals, and gallbladder. A timed sequence was helpful in maintaining consistency across sessions, including nonreflexology sessions with members of the control group. Reflexology maps and additional information are available online, and professional organizations include the Reflexology Association of America and the American Reflexology Certification Board. If at any time during the session the patient wished to stop, withdraw from the study, or request medications resulting in study disqualification, they were made aware that they could do so.

Data Management and Analysis

Data were collected and input directly by participants via an electronic survey or by the PI if a paper version was completed; data were managed through REDCap, an electronic database and data-capture tool. To reduce investigator bias and avoid potential alterations in the reflexology technique, the PI did not examine patients’ presession survey responses prior to the intervention and left the room while patients completed the postsession survey. Group (intervention versus control) by time (presession versus postsession) analysis of variance was used to analyze the data.

Results

Participants

The research question involved determining the impact of foot reflexology on pain and nausea for inpatients with cancer compared to traditional nursing care alone. From 2016 to 2018, 43 patients were screened for participation. One consented but was unable to schedule a time to participate during their hospitalization. Two were found to be ineligible during the consenting process. A total of 40 participants completed the study, with 20 in the intervention group and 20 in the control group.

Sample Characteristics

Participant demographics are shown in Table 1. Most participants were aged older than 50 years and female. The most recent treatment for the majority of participants was chemotherapy. Regarding cancer diagnosis, most participants had leukemia. Most listed their reason for being hospitalized as related to treatment.

Medical records confirmed no significant differences between the groups with respect to time since last pain and/or nausea medication ($t \leq -1.51$, $p \geq 0.08$). Participants were asked about integrative therapies (e.g., healing touch, massage, essential oils, guided imagery, music therapy) used in the past two hours. For pain, seven participants in the control group and three in the intervention group had engaged in other integrative therapies during this time frame. For nausea, five participants in the control group and one in the intervention group had engaged in other integrative therapies.

Group by time mixed analyses of variance reveal a significant interaction for pain scores with substantial improvement from presession to postsession among the intervention group, but not for controls ($F[1, 38] = 28.6$, $p < 0.0001$). Nausea scores showed improvement, but without statistical significance ($F[1, 38] = 3.83$, $p = 0.06$). These results are outlined in Table 2.

Discussion

Pain affects 40%–90% of patients with cancer, and 40%–70% of patients with cancer experience nausea (Lee et al., 2015; Özdelikara & Tan, 2017). Opioids remain the main option for pain management in patients with cancer; however, older patients experience more side effects (National Cancer Institute, 2021; Rosa et al., 2021).

Results of this study indicate that foot reflexology significantly decreases pain for inpatients with cancer as compared to traditional nursing care alone. Few studies have examined foot reflexology among patients on an inpatient oncology unit, and even fewer have studied its use as part of nursing practice. Although its effects on nausea are not statistically significant, they may be clinically relevant; the mean changes in pre- and postsession nausea ratings indicate at least some decreased nausea among intervention group members. These findings have important practice implications because quality of life may be positively affected when relief from chemotherapy-induced nausea and vomiting occurs (Moradian & Howell, 2015).

No harmful or concerning effects of foot reflexology are reported in the current study, echoing previous studies highlighted by Unlu et al. (2018) in their systematic review, which discussed the overall safety of reflexology. Contraindications include gout, leg ulcers, peripheral vascular disease, deep vein thrombosis, infections, wounds, bruises, and lymphedema (Unlu et al., 2018). The positive findings of the current study contrast with those from studies that have determined no significant benefit when evaluating multiple cancer-related symptoms, as Unlu et al. (2018) concluded.

These findings are consistent with the results noted by Robison and Smith (2016), which indicate a decrease in pain and nausea following massage treatment on feet and hands, and reflexology specifically on the feet alone. Findings from the current study support de Oliveira et al.'s (2017) findings of significant pain reduction after foot reflexology. The study by de Oliveira et al. (2017) evaluated only lower back pain, whereas the current study expands that research by including any areas of pain reported by participants. The current study confirms positive results from just one reflexology session, whereas other studies, like that by Naseri-Salahshour et al. (2019), show positive results after several sessions.

Limitations

Study limitations include a relatively small sample size. To keep session numbers equivalent across participants, this study was designed to provide a single reflexology or control session because participants were inpatients and could be discharged at any time. Multiple sessions using a repeated-measures design would strengthen the study.

Expectancy bias must be considered because participants were aware of the study purpose: to determine whether foot reflexology affected pain and nausea (Decision Lab, n.d.). In addition, they may have felt an obligation to report decreased pain or nausea after the session because the PI performed the reflexology intervention. To minimize bias, the PI left the room while the survey was completed. Without the same level of nurse presence and touch in the control group, it is impossible to determine whether touch alone contributed to the decrease in pain and nausea. Underlying comorbidities, such as neuropathy, were not part of the exclusion criteria, and it is unclear whether these affected participants' experience.

Finally, some individuals who qualified for the study were likely missed; the study was designed to rely on unit staff to distribute recruitment flyers to all patients. Competing staff priorities resulted in less than 100% distribution, and some individuals may have been inadvertently excluded.

Implications for Research

There is ample opportunity for future research in reflexology. Consideration should be given to pain and nausea medication timing. Increased time between medications following foot reflexology could serve as validation of a decreased need for pharmaceutical relief. In future studies, blinding participants to study condition by providing a generic foot massage to the control group has the potential to better control expectancy effects. Separating symptoms (i.e., recruiting individuals with only nausea or only pain) could provide more clarity on

the specific effects of reflexology. In addition, studies designed to identify the subtypes of pain (e.g., nerve, bone, spiritual, localized, generalized) would be beneficial; results from the current study may not conclude that reflexology affects all types of pain.

There is also opportunity for alterations with reflexology techniques, such as using other reflexes or zones of the feet, and reflexes on hands and ears. Examining differences between reflexology practitioners with differing types of training may be beneficial. In addition, studying the effects of reflexology in other patient populations could support reflexology as a complementary therapeutic practice in nursing.

Implications for Nursing

Based on study findings, there may be benefit in providing basic foot reflexology training for bedside oncology staff, so that they may offer the therapy to patients and provide education to both patients and families. Florence Nightingale, a visionary of holistic nursing, was one of the first to teach nurses to practice holistic care, which is recognized as a nursing specialty by the American Nurses Association (American Holistic Nurses Association, n.d.). The importance of integrative and holistic care for inpatients with cancer is continuing to evolve, particularly with consideration of the current opioid crisis. Reflexology offers an alternative or adjuvant to pain, and possibly nausea, medications. In addition, patients and families can be educated to perform reflexology for self-care at home or encouraged to seek out community practitioners, possibly preventing admissions to the hospital and empowering patients at a vulnerable time. Because reflexology training takes time and resources, nurses might consider the benefits of massage to patients' feet, hands, and ears, which is simple to learn and safe (Fontaine, 2015).

As indicated by Blunt (2006), "reflexology is a non-invasive, low cost, hands-on modality that can become a wonderful adjunct to any nurse's skills set" (p. 258). Relatively few studies examine foot reflexology within the scope of nursing care (Abbaszadeh et al., 2018; Allahbakhhsian et al., 2020). Studies specifically designed to address foot reflexology as a standard nursing practice could be beneficial and add important information to the body of evidence. Although the resources required for reflexology certification may be difficult to obtain for some nurses, simple reflexology techniques could be easily taught. These techniques could be a part of the nursing school curriculum, along with other modalities.

Reflexology results may contribute to support for integrative therapy programs within hospital systems, highlighting the contributions that integrative therapies, including reflexology, can offer to patients. For example, Hartford Hospital in Connecticut (Hartford HealthCare, n.d.) and Children's Minnesota (n.d.) offer integrative therapy training to patients, families, and staff. Children's Minnesota (n.d.) is recognized as the oldest continuing pediatric clinical integrative medicine program in North America. Both hospitals could be prototypes for other institutions training bedside staff in integrative therapies. This study supports reflexology as a valuable addition to nursing interventions to relieve pain and nausea in inpatients with cancer.

Conclusion

Integrative therapies, such as reflexology, show positive results for managing symptoms in patients with cancer. This pilot study's results note significant decreases in pain in patients with cancer after only one session. More studies evaluating the effects of reflexology on nausea may be beneficial. Reflexology can be easily taught to bedside nurses for symptom management in patients with cancer, as well as shared with patients and their families to empower them upon discharge.

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IMPLICATIONS FOR PRACTICE

- Promote the finding that integrative therapies can significantly decrease oncology treatment–related pain, and encourage nurses to seek additional training in integrative therapy modalities.
- Acknowledge that patients may be empowered to request integrative therapy to decrease treatment-related symptoms.
- Administer reflexology treatment as an alternative or additional strategy to reduce pain and nausea in patients with cancer.

TABLE 1.

SAMPLE CHARACTERISTICS BY GROUP

	OVERALL (N = 40)		CONTROL (N = 20)		INTERVENTION (N = 20)	
CHARACTERISTIC	**n**	**%**	**n**	**%**	**n**	**%**
Age (years)						
18–28	3	8	2	10	1	5
29–39	5	13	1	5	4	20
40–50	3	8	2	10	1	5
51–65	15	38	7	35	8	40
66–80	14	35	8	40	6	30
Cancer diagnosis						
Leukemia	15	38	7	35	8	40
Lymphoma	6	15	4	20	2	10
Brain	3	8	2	10	1	5
Colon	3	8	–	–	3	5
Multiple myeloma	3	8	2	10	1	5
Lung	2	5	1	5	1	5
Ovarian	2	5	1	5	1	5
Sarcoma	2	5	1	5	1	5
Pancreatic	1	3	–	–	1	5
Other	3	8	2	10	1	5
Gender						
Female	25	63	14	70	11	55
Male	15	38	6	30	9	45
Last treatment						
Chemotherapy	34	85	17	85	17	85
Radiation therapy	2	5	1	5	1	5
Other	4	10	2	10	2	10
Reason for admission						
Cancer treatment	19	48	11	55	8	40
Infection	4	10	3	15	1	5
Pain control	4	10	1	5	3	15
Bowel obstruction	2	5	1	5	1	5
Other[a]	11	28	4	20	7	35

[a]Includes bleeding, fluids, breathing problems, graft-versus-host disease, and listed cancer diagnosis

Note. Because of rounding, percentages may not total 100.

TABLE 2.

PRE- AND POSTSESSION COMPARISONS OF PAIN AND NAUSEA SCORES BY GROUP

	PRESESSION PAIN		POSTSESSION PAIN		PRESESSION NAUSEA		POSTSESSION NAUSEA	
GROUP	$\overline{X}$	**95% CI**	$\overline{X}$	**95% CI**	$\overline{X}$	**95% CI**	$\overline{X}$	**95% CI**
Control (N = 20)	3.7	[2.7, 4.6]	3.7	[2.6, 4.8]	2.6	[1.4, 3.7]	2.5	[1.2, 3.8]
Intervention (N = 20)	4	[2.9, 5]	1.6	[0.9, 2.2]	2.2	[1.1, 3.2]	0.8	[0.3, 1.3]

CI—confidence interval

Note. Visual analog scale scores ranged from 0 (no pain or nausea) to 10 (worst pain or nausea possible).