

Comparing the Efficacy of Acupressure and Foot Reflexology on Sleep Quality in Patients With Leukemia: A Comparative Clinical Trial

Integrative Cancer Therapies
Volume 23: 1–8
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DOI: 10.1177/15347354241261356
journals.sagepub.com/home/ict



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Abstract

Background: Among leukemia patients, sleep disruptions are prevalent and can profoundly affect their overall quality of life. Acupressure and foot reflexology, modalities rooted in traditional Chinese medicine, have garnered attention for their potential to address sleep disturbances and mitigate associated symptoms. **Methods:** This research utilized a randomized controlled trial with a pretest-posttest design involving 102 leukemia patients admitted to Imam Khomeini Hospital in Urmia. Participants were randomly allocated to 3 groups: acupressure (n=34), reflexology (n=34), or control (n=34). Prior to the intervention, patients completed a demographic survey and the Pittsburgh Sleep Quality Index (PSQI) for baseline assessments. Acupressure involved stimulation of the SP6 point twice daily for 10 minutes over 4 weeks, while reflexology entailed daily 10-minute sessions with sweet almond oil on the soles for the same duration. The control group received standard care without additional interventions. Following the 4-week intervention period, post-intervention evaluations were conducted using identical measurement tools. **Results:** The findings underscored the efficacy of both acupressure and foot reflexology in significantly improving sleep quality within the intervention groups ($P < .001$). Initially, there were no notable differences in sleep quality among the 3 groups ($P > .05$). Subsequently, pairwise comparisons adjusted with Bonferroni corrections revealed significant disparities in sleep quality between the acupressure and reflexology groups compared to the control group ($P < .001$). However, post-intervention analysis indicated no statistically significant variance in enhancing sleep quality between the acupressure and foot reflexology groups ($P < .05$). **Conclusion:** This study demonstrates that acupressure and foot reflexology interventions can enhance sleep quality in individuals with leukemia. These findings support the effectiveness of these complementary modalities, offering targeted relief and relaxation. While these non-invasive therapies show promise in improving well-being, further research is needed to confirm and expand upon these results due to study limitations.

Keywords

acupressure, reflexology, patients, sleep quality, leukemia

Submitted December 15, 2023; revised April 23, 2024; acceptance May 28, 2024

Introduction

Leukemia, a malignancy impacting blood and bone marrow, presents a myriad of challenges for patients, encompassing physical and emotional burdens.¹ Among these obstacles, disrupted sleep patterns emerge as significant contributors to the overall strain experienced by individuals battling this relentless disease.² In recent years, unconventional therapeutic approaches like acupressure and foot reflexology have garnered attention for their potential to enhance sleep quality and alleviate associated symptoms in various medical contexts.^{3,4}

Sleep disturbances in leukemia patients stem from a combination of factors, including pain, anxiety, medication side effects, and the disease's inherent impact.⁵

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While conventional medical interventions primarily focus on symptom management through pharmaceuticals or standard treatments, complementary modalities such as acupressure and foot reflexology offer a non-invasive and potentially effective means to address sleep-related issues and bolster the holistic well-being of leukemia patients.^{6,7}

Acupressure, rooted in ancient Chinese medicinal principles, involves applying targeted pressure to specific points on the body to facilitate healing and support the harmonious flow of energy.^{8,9} Conversely, foot reflexology operates on the belief that distinct points on the feet correspond to various organs and systems within the body. Reflexologists aim to evoke healing responses and restore balance by stimulating these points.^{10,11}

Although extensive research exists on the effects of acupressure and foot reflexology on sleep quality in general populations and certain medical conditions, the knowledge pertaining specifically to leukemia patients remains limited.^{12,13} Nonetheless, preliminary evidence suggests that these alternative therapeutic modalities hold considerable promise in mitigating sleep disturbances, attenuating pain levels, and enhancing overall quality of life. By incorporating acupressure and foot reflexology into the comprehensive care paradigm for leukemia patients, a truly holistic approach can be forged, addressing not only the physical manifestations but also the emotional and psychological dimensions associated with sleep disruptions. The study's importance lies in its potential to address a critical gap in understanding how alternative therapies like acupressure and foot reflexology could positively impact the sleep quality of leukemia patients. Given these patients' challenges, such as compromised sleep quality, the study aims to shed light on effective non-invasive interventions that could significantly enhance their overall well-being and quality of life.

The hypotheses for this study were formulated based on the literature findings in this field, and they are as follows:

- (1) Participants who underwent acupressure would exhibit higher scores in sleep quality compared to the control group.
- (2) Participants who underwent reflexology would demonstrate higher scores in sleep quality compared to the control group.
- (3) Participants who underwent acupressure would display differing scores in sleep quality when compared to those who experienced reflexology.

Method

Study Design & Setting

This research, conducted in 2023 at Imam Khomeini Hospital in Urmia, Iran, adopted a single-blinded, 3-group randomized controlled trial with a pretest-posttest design. Participants were allocated to the acupressure group (n=34),

foot reflexology group (n=34), or control group (n=34). To ensure methodological rigor, the study adhered to the CONSORT 2010 checklist for comprehensive reporting (refer to Supplemental File).

Sampling and Randomization Strategy

The study focused on leukemia patients admitted to Imam Khomeini Hospital in Urmia. Sample size determination utilized G*Power, with calculations indicating a minimum of 31 participants per group based on a previous study,¹⁴ with a 95% confidence level and 80% power. Factoring in a 10% attrition rate, the final sample size was set at 102 individuals (n=34 per group).

$$n = \frac{(z_{1-\frac{\alpha}{2}} + z_{1-\beta})(\delta_1^2 + \delta_2^2)}{(\mu_1 - \mu_2)^2}$$

$$\frac{(1.96 + 0.84)^2 + (1.65^2 + 1.44^2)}{(2.33 - 1.20)^2} = 31$$

The study involved 102 leukemia patients admitted to Imam Khomeini Hospital in Urmia. They were selected using random sampling and divided into 3 intervention groups: acupressure (n=34), reflexology (n=34), and a control group (n=34). Patients were randomly assigned to these groups by drawing cards labeled as (A), (B), and (C). Participants were only presented with the backs of cards that looked identical, ensuring they chose blindly. Participants who drew the (A) card joined the acupressure group, those who drew the (B) card joined the reflexology group, and those who drew the (C) card joined the control group. The researcher ensured random allocation by using cards labeled (A), (B), and (C) to assign participants to the respective groups.

Inclusion and exclusion criteria. Inclusion criteria involved meeting age requirements (18-50 years old), having a leukemia diagnosis, no history of foot injury or surgery, and undergoing chemotherapy with drugs such as fludarabine (Fludara[®]), pentostatin (Nipent[®]), chlorambucil (Leukeran[®]), bendamustine (Treanda[®]), and cyclophosphamide (Cytoxan[®]). Exclusion criteria comprised unwillingness to continue participation, missing multiple training sessions, incomplete questionnaires, patient demise, or transfer to another healthcare facility. Moreover, patients undergoing simultaneous radiotherapy were excluded.

Measurements

Data collection involved utilizing a demographic questionnaire and the Pittsburgh Sleep Quality Index (PSQI). The demographic questionnaire encompassed details regarding age, gender, marital status, educational background, residency, and occupation.

The PSQI, a widely utilized tool, evaluates sleep quality and disturbances spanning 1 month. Comprising 19 self-assessed queries and, if applicable, 5 additional questions for a roommate or bed partner, it delves into various sleep facets like duration, disruptions, onset, medication usage, daytime dysfunction, and overall sleep quality. Each question receives a score from 0 to 3. Higher values signify inferior sleep quality. Cumulative scores yield a global score ranging from 0 to 21, with a score of 5 or higher indicating subpar sleep quality.¹⁵ Demonstrating reliability and validity across diverse populations, including clinical and non-clinical samples, the PSQI finds utility in research endeavors, clinical trials, and sleep medicine practice.¹⁶ Buysse et al¹⁵ highlighted the tool's reliability (Cronbach's alpha of .83) and validity (sensitivity of 0.89 and specificity of 0.69) in their study participants.

Procedure

The researcher received ethical approval and necessary documentation from the University Ethics Committee to conduct a randomized controlled trial (RCT) at Imam Khomeini Medical and Educational Center. After coordination with the department head and relevant physician, participants meeting the inclusion criteria were selected using random sampling and assigned to 1 of 3 groups: acupressure, reflexology, or control. Out of 110 eligible patients, 4 declined participations, 2 did not meet the criteria, and 2 were transferred to other medical facilities due to deteriorating health (Figure 1). In this study, participants were informed about the research objectives but not explicitly told whether they would receive a specific intervention or usual treatment. By framing the study as an investigation into sleep in hospitalized leukemia patients without disclosing group assignments, the aim was to minimize the likelihood of participants in the control group realizing they were not receiving an intervention. Consent discussions were structured to focus on the broader research goals rather than individual group assignments, aiming to maintain blinding and enhance the study's integrity.

One hundred two leukemia patients were selected and randomly allocated to their respective groups. The researcher introduced herself to the participants, explained the research objectives, and obtained informed written consent. Pre-tests were conducted using demographic questionnaires and the PSQI (Pittsburgh Sleep Quality Index) to gather baseline data. Each group was isolated from the others, ensuring they were unaware of the other group's existence, and the ward staff was also informed accordingly. The patients in the 3 groups actually assigned to different units. The ward staff has been informed about the study and the need for patient isolation. They have

been instructed not to discuss the treatments or interventions with the patients or between themselves in the presence of the patients.

The acupressure group received routine care, and acupressure was administered on the SP6 acupoint twice daily for 4 weeks. The researcher was trained and certified in both acupuncture and reflexology. The interventions were performed by the researcher, who had received proper training and certification in these complementary therapies. The researcher performed the acupressure using the thumb or index finger. Using sweet almond oil, the reflexology group received routine care and daily reflexology massages on both feet for 10 minutes. The control group did not receive any intervention and continued with standard care provided by the nursing staff.

All sessions took place in a quiet and undisturbed environment, with signs on the patients' doors requesting others not to enter. The study was conducted over 3 months, from February to April 2023. One month after completing the educational sessions, the participants filled out the questionnaires again, and the results were compared among 3 groups.

Data analysis was carried out in a single-blinded fashion, with the data analyst uninformed about the allocation to intervention or control groups. IBM SPSS Statistics software was employed for statistical analyses, with a significance threshold set at $P < .05$. The normality of the data was assessed using the Kolmogorov-Smirnov test, and participant characteristics were summarized using descriptive statistics. The paired *t*-test was utilized to compare sleep quality scores pre- and post-intervention within each group. Subsequent analyses compared the acupressure group against the control group, the reflexology group against the control group, and the acupressure group against the reflexology group.

Results

Demographic Characteristics

The mean age of participants was 41.02 ± 09.11 , 39.29 ± 08.88 , and 42.71 ± 09.31 years in the acupressure, reflexology, and control groups, respectively. These results indicated no significant difference in age between the intervention and control groups. The 1-way ANOVA test revealed that the 3 groups had similar mean ages, with a *P*-value of .16, indicating homogeneity.

Furthermore, the statistical analysis indicated no significant differences between the 3 groups regarding gender, marital status, education level, residence, and occupation. The *P*-values for these variables were all greater than .05, suggesting no statistically significant variation among the groups (Table 1).

Table 1. Comparison of Demographic Characteristics of the Patients in the Study Groups.

Variable		Group			Result
		Control n (%)	Reflexology n (%)	Acupressure n (%)	
Gender	Male	16 (50)	16 (48.5)	22 (66.7)	$\chi^2 = 2.705$ $df = 2$ $*P = .25$
	Female	16 (50)	17 (51.5)	11 (33.3)	
Education level	Elementary	2 (6.2)	1 (3)	3 (9.1)	$\chi^2 = 4.611$ $df = 6$ $*P = .59$
	Secondary	7 (21.9)	6 (18.2)	7 (21.2)	
	High school	13 (40.6)	10 (30.3)	7 (21.2)	
Marital status	Higher education	10 (31.2)	16 (48.5)	16 (48.5)	$\chi^2 = 0.231$ $df = 2$ $*P = .89$
	Single	8 (25)	10 (30.3)	9 (27.3)	
Occupation	Married	24 (75)	23 (69.7)	24 (72.2)	$F = 4.487$ $df = 4$ $**P = .34$
	Employed	21 (65.6)	23 (69.7)	20 (60.6)	
	Unemployed	10 (31.2)	10 (30.3)	10 (30.3)	
Residence	Inactive	1 (3.1)	0 (0)	3 (9.1)	$\chi^2 = 0.717$ $df = 2$ $*P = .69$
	Urban	22 (68.8)	25 (75.8)	22 (66.7)	
Age	Rural	10 (31.2)	8 (24.2)	11 (33.3)	$t = 1.863$ $df = 2$ $***P = .16$
		Control Mean \pm SD ^a 42.71 \pm 09.31	Reflexology Mean \pm SD 39.29 \pm 08.88	Acupressure Mean \pm SD 41.02 \pm 09.11	

^aStandard Deviation.

*Chi-squared test. **Fisher's exact test. ***1 way ANOVA.

Table 2. Comparison of the Mean Sleep Quality Scores of the Patients in the Study Groups Before and After the Intervention.

Variables	Groups	Before the intervention	After the intervention	P-value
		Mean \pm SD	Mean \pm SD	
Sleep quality	Acupressure	16.39 \pm 1.32	12.07 \pm 1.84	$*P < .001$ $*P < .001$ $*P = .832$
	Reflexology	16.30 \pm 1.29	11.78 \pm 1.47	
	Control	16.78 \pm 1.38	16.21 \pm 1.40	
P-value		$**P = .964$	$**P < .001$	-

*Paired t-test. **1 way ANOVA.

Sleep Quality

The Kolmogorov-Smirnov test assessed the normal distribution of sleep quality scores within each group, demonstrating normal distribution ($P > .05$). The results from the 1-way ANOVA indicated no significant difference in the average sleep quality score between the 3 groups before the intervention ($P > .05$). However, after the intervention, a significant difference was observed in the mean sleep quality score among the 3 groups ($P < .001$) (Table 2).

When analyzing each group separately, the paired *t*-test revealed a significant difference in sleep quality scores before and after the intervention in both the acupressure group ($P < .001$) and the reflexology group ($P < .001$). However, in the control group, there was no statistically

significant difference in sleep quality scores before and after the intervention ($P > .05$) (Table 2).

Further pairwise comparisons using the Bonferroni correction test showed that the acupressure and reflexology groups had significantly lower sleep quality scores than the control group after the intervention ($P < .001$). However, there was no statistically significant difference in the mean sleep quality scores between the acupressure and reflexology groups after the intervention. The trend of changes in the mean overall fatigue scores in the 3 groups before and after the intervention suggests a slight decrease in sleep quality scores in the intervention groups, implying better sleep quality (Figure 2). These results emphasize the effectiveness of both interventions in reducing patient sleep quality scores (Table 3).

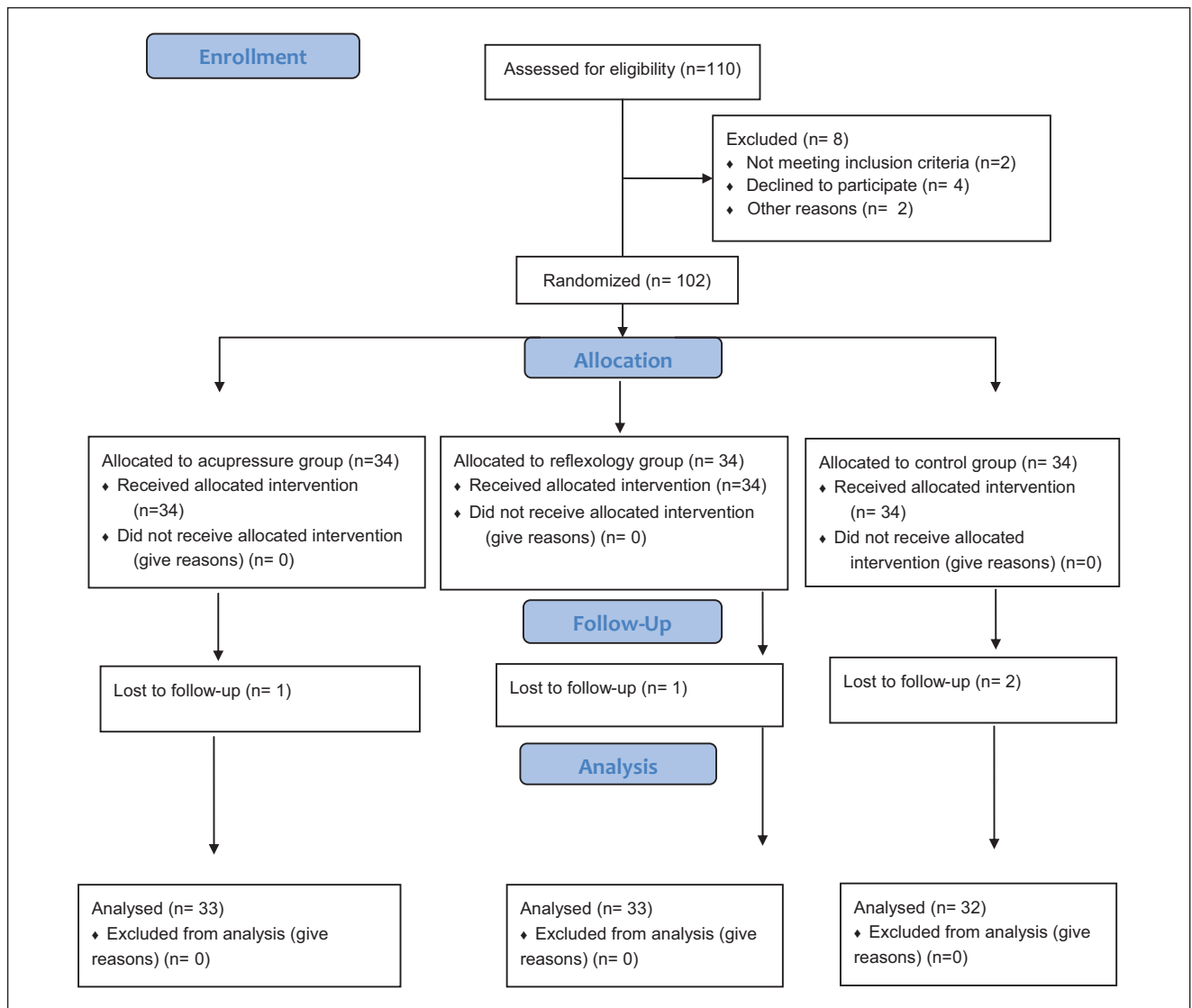


Figure 1. Research flow diagram based on Consort statement.

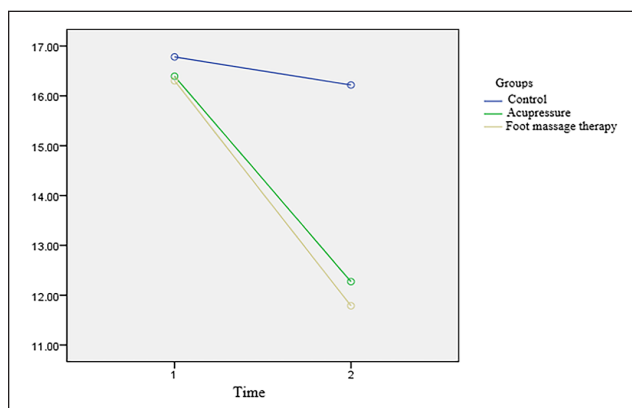


Figure 2. The trend of changes in the mean sleep quality scores in the 3 groups before and after the intervention.

Discussion

This investigation focused on evaluating the influence of acupressure and foot reflexology on sleep quality in leukemia patients. Following the intervention, noticeable enhancements in sleep quality were observed in the acupressure and reflexology groups compared to the control group. These outcomes align with earlier research exploring the effects of these interventions on sleep quality across diverse patient cohorts.

The study's results indicated a significant enhancement in sleep quality following the acupressure intervention. The results support the first hypothesis, confirming that acupressure effectively enhances sleep quality among participants, as predicted. Participants undergoing acupressure showed higher sleep quality scores than the control group.

Table 3. Binary Comparisons After the Intervention.

Variable	Group A	Group B	The mean difference (B – A)	*P-value
Sleep quality	Control group	Acupressure	11.4658	$P < .001$
		Reflexology	10.3658	$P < .001$
	Acupressure	Reflexology	0.9869	$P = .698$

*Bonferroni pairwise comparison.

Several prior studies have reported similar positive effects of acupressure on sleep quality. A study by Cheng et al¹⁷ on cancer patients found that acupressure significantly improved sleep quality and reduced insomnia symptoms. Another study by Huang et al¹⁸ investigated the effects of acupressure on sleep quality in postpartum women and found significant improvements.

Following the intervention, the results showed a significant enhancement in sleep quality within the reflexology group when compared to the control group. The findings uphold the second hypothesis, indicating that reflexology improves sleep quality among participants compared to the control group. As hypothesized, participants receiving reflexology exhibited higher sleep quality scores. A study by Lee et al¹⁹ on individuals with chronic insomnia found that foot reflexology significantly improved sleep quality and reduced sleep disturbances. Another study by Kang et al²⁰ investigated the effects of foot reflexology on sleep quality in older adults and observed significant improvements.

Post-intervention analysis revealed no statistically significant variance in the improvement of sleep quality between the acupressure and foot reflexology groups. The third hypothesis was not validated, as anticipated differences in sleep quality scores between participants undergoing acupressure and reflexology were not observed. Compared to these previous studies, our findings align with the notion that acupressure and foot reflexology can effectively enhance sleep quality in patients with various health conditions, including leukemia. The positive outcomes observed in our study suggest that these interventions may be promising non-pharmacological approaches for managing sleep disturbances in this specific patient population.

In addition to the studies mentioned earlier, several other previous studies have explored the effects of acupressure and foot reflexology on sleep quality in different patient populations, providing further insights for comparison.

Similar to our study results in leukemia patients, a study by Zhang et al²¹ investigated the impact of acupressure on sleep quality in patients with fibromyalgia. The findings revealed that acupressure significantly improved sleep quality and reduced sleep disturbances.

Similarly, a study by Rahmani et al²² showed that foot reflexology significantly improved sleep quality and reduced sleep latency in patients with coronary artery disease, supporting the positive outcomes observed in our study.

Another study by Çalışkan and Cerit focused on the effects of acupressure on sleep quality in patients with chronic obstructive pulmonary disease (COPD). The findings demonstrated that acupressure significantly improved sleep quality and reduced the severity of insomnia symptoms, further supporting the effectiveness of acupressure in enhancing sleep quality.²³

Furthermore, a study by Tarrasch et al investigated the effects of foot reflexology on sleep quality in patients with breast cancer. The results indicated that foot reflexology significantly improved sleep quality and reduced sleep disturbances, consistent with the positive outcomes in leukemia patients observed in our study.²⁴

When comparing our results with these additional studies, we see a consistent pattern of positive effects of acupressure and foot reflexology on sleep quality across various patient populations. These findings suggest that these interventions may have broad applicability in improving sleep quality and managing sleep disturbances in different health conditions.

However, it is essential to consider the variations in study designs, populations, and outcome measures among these studies. While the overall trend is promising, further research is necessary to establish more robust evidence and to explore potential mechanisms underlying the effects of acupressure and foot reflexology on sleep quality in patients with leukemia and other health conditions.

Study Limitations

Nonetheless, it is imperative to recognize certain constraints within our study. Initially, the relatively modest sample size may constrain the applicability of our results. Furthermore, the absence of a prolonged follow-up evaluation hinders our ability to ascertain the enduring impacts of acupressure and foot reflexology on sleep quality among leukemia patients. Subsequent research endeavors necessitate larger sample sizes and extended monitoring periods to corroborate and expand upon our findings.

Conclusion

In conclusion, the present study provides compelling evidence that acupressure and foot reflexology interventions effectively enhance sleep quality in individuals with leukemia. These

results align with prior research across diverse patient cohorts, endorsing the efficacy of these uncomplicated yet promising complementary modalities. The targeted relief of discomfort and induction of relaxation offered by acupressure and foot reflexology interventions have the potential to enrich the holistic sleep experience for leukemia patients. By delivering non-invasive modalities, these therapies not only address sleep disturbances but also contribute to enhancing the overall well-being of those coping with leukemia. While these non-pharmacological methods present valuable alternatives for managing sleep issues in leukemia patients, further investigations are warranted to validate and elaborate on these findings, considering the study's limitations.

Acknowledgments

We extend our appreciation to the authorities at Urmia University of Medical Sciences for their collaboration and backing. Gratitude is also extended to the officials at Imam Khomeini Hospital, the dedicated oncology ward staff, and all the esteemed patients whose participation facilitated this research. Special thanks are due to Mariam Angelica Parizad for her meticulous review and editing of the manuscript.

Authors' Contributions

AH led the initial development and design of the procedure. RG, AH, and NP played pivotal roles in the comprehensive literature review, which laid the groundwork for establishing the study's rationale and context. Guidance on methodological design and statistical analysis approaches was provided by HKH and AN. The original draft of the manuscript was authored by RG, with significant contributions from RG and NP in its revision. The final paper underwent collaborative input and approval by all authors.

Availability of Data and Materials

Original study data are available from the corresponding author on reasonable request.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Ethics Approval and Consent to Participate

This study has obtained ethical approval from the review board of Urmia University of Medical Sciences (Ethical No. IR.UMSU.REC.1397.490).

Consent for Publication

Prior written consent was acquired from the participant for the publication of this research. The editor-in-chief of this journal may request a copy of the written consent for review.

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Supplemental Material

Supplemental material for this article is available online.

References

1. Efficace F, Breccia M, Avvisati G, et al. Health-related quality of life, symptom burden, and comorbidity in long-term survivors of acute promyelocytic leukemia. *Leukemia*. 2019;33:1598-1607. doi:10.1038/s41375-018-0325-4
2. Steur LMH, Kaspers GJL, Van Someren EJW, et al. Sleep-wake rhythm disruption is associated with cancer-related fatigue in pediatric acute lymphoblastic leukemia. *Sleep*. 2020;43:zsz320. doi:10.1093/sleep/zsz320
3. Rambod M, Pasyar N, Shamsadini M. The effect of foot reflexology on fatigue, pain, and sleep quality in lymphoma patients: a clinical trial. *Eur J Oncol Nurs*. 2019;43:101678. doi:10.1016/j.ejon.2019.101678
4. Cheraghbeigi N, Modarresi M, Rezaei M, Khatony A. Comparing the effects of massage and aromatherapy massage with lavender oil on sleep quality of cardiac patients: a randomized controlled trial. *Complement Ther Clin Pract*. 2019;35:253-258. doi:10.1016/j.ctcp.2019.03.005
5. Liew SC, Aung T. Sleep deprivation and its association with diseases- a review. *Sleep Med*. 2021;77:192-204. doi:10.1016/j.sleep.2020.07.048
6. Toygar Yeşilbalkan ÖU, Malseven YG, Sönmez E. Effect of reflexology on anxiety and sleep of informal cancer caregiver: randomized controlled trial. *Complement Ther Clin Pract*. 2020;39:101143. doi:10.1016/j.ctcp.2020.101143
7. Pouraboli B, Poodineh Z, Jahani Y. The effect of relaxation techniques on anxiety, fatigue and sleep quality of parents of children with leukemia under chemotherapy in South East Iran. *Asian Pac J Cancer Prev*. 2019;20:2903-2908. doi:10.31557/APJCP.2019.20.10.2903
8. Carotenuto M, Gallai B, Parisi L, Roccella M, Esposito M. Acupressure therapy for insomnia in adolescents: a polysomnographic study. *Neuropsychiatr Dis Treat*. 2013;9:157-162. doi:10.2147/NDT.S41892
9. Molaee H, Goli R, Faraji N, et al. The effect of acupressure on sleep quality in patients with leukemia: a single-center, randomized controlled trial. *Ann Med Surg*. 2023;10:1-23. doi:10.1097/ms9.0000000000001401
10. Marcolin ML, Tarot A, Lombardo V, et al. The effects of foot reflexology on symptoms of discomfort in palliative care: a feasibility study. *BMC Complement Med Ther*. 2023;23:66-68. doi:10.1186/s12906-023-03873-5
11. Unal KS, Balci Akpınar R. The effect of foot reflexology and back massage on hemodialysis patients' fatigue and sleep quality. *Complement Ther Clin Pract*. 2016;24:139-144. doi:10.1016/j.ctcp.2016.06.004
12. Parizad N, Hassanpour A, Goli R, Khalkhali H, Nozad A. Comparing the impact of acupressure and reflexology on fatigue in chronic lymphocytic leukemia patients: a randomized controlled trial with three arms. *Eur J Oncol Nurs*. 2024;70:102573.
13. Goli R, Faraji N, Maroofi H, Hassanpour A. Effect of spiritual care on the quality of life in patients who underwent

- intracranial hemorrhage surgery: a randomized controlled trial. *Int J Surg*. 2024;110:167-175.
14. Okuyama T, Akechi T, Kugaya A, et al. Development and validation of the cancer fatigue scale: a brief, three-dimensional, self-rating scale for assessment of fatigue in cancer patients. *J Pain Symptom Manag*. 2000;19:5-14.
 15. Buysse DJ, Reynolds CF III, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Res*. 1989;28:193-213. doi:10.1016/0165-1781(89)90047-4
 16. Souza LFF, Paineiras-Domingos LL, Melo-Oliveira MES, et al. The impact of COVID-19 pandemic in the quality of sleep by Pittsburgh Sleep Quality Index: a systematic review. *Cien Saude Colet*. 2021;26:1457-1466. doi:10.1590/1413-81232021264.45952020
 17. Cheng HL, Yeung WF, Wong HF, Lo HT, Molassiotis A. Self-acupressure for symptom management in cancer patients: a systematic review. *J Pain Symptom Manag*. 2023;66:e109-e128. doi:10.1016/j.jpainsymman.2023.03.002
 18. Huang HC, Chen KH, Kuo SF, Chen IH. Can foot reflexology be a complementary therapy for sleep disturbances? Evidence appraisal through a meta-analysis of randomized controlled trials. *J Adv Nurs*. 2021;77:1683-1697. doi:10.1111/jan.14699
 19. Lee KC, Chao YC, Lin YP, Wang HC. Effectiveness of self-administered acupressure for family caregivers of advanced cancer patients with insomnia: a randomized controlled trial. *Cancer Nurs*. 2022;45:E1-E9. doi:10.1097/NCC.0000000000000870
 20. Kang JI, Lee EH, Kim HY. Effects of aroma foot massage on sleep quality and constipation relief among the older adults living in residential nursing facilities. *Int J Environ Res Public Health*. 2022;19:5567. doi:10.3390/ijerph19095567
 21. Zhang XC, Chen H, Xu WT, et al. Acupuncture therapy for fibromyalgia: a systematic review and meta-analysis of randomized controlled trials. *J Pain Res*. 2019;12:527-542. doi:10.2147/JPR.S186227
 22. Rahmani A, Naseri M, Salaree MM, Nehrir B. Comparing the effect of foot reflexology massage, foot bath and their combination on quality of sleep in patients with acute coronary syndrome. *J Caring Sci*. 2016;5:299-306. doi:10.15171/jcs.2016.031
 23. Çalışkan MA, Cerit B. Effect of therapeutic touch on sleep quality and anxiety in individuals with chronic obstructive pulmonary disease: a randomized controlled trial. *Complement Ther Clin Pract*. 2021;45:101481. doi:10.1016/j.ctcp.2021.101481
 24. Tarrasch R, Carmel-Neiderman NN, Ben-Ami S, 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;24:62-68. doi:10.1089/acm.2017.0023