DIJMSR Received: 8-5-2025 Accepted: 23-5-2025

Effect of Foot Reflexology Versus Acupressure on Sleep Disturbances and Hot Flashes in Postmenopausal Women.

Elham Shahat Hassan[1], Yasmeen Samir Abdelazeem Ali[2*], Mohamed Ahmed Awad[3], Walid Mohamed Elnagar[4], Shreen R. Abdoelmagd[5,6].

[1]PhD, Lecturer of Physical Therapy for Women Health, Faculty of Physical Therapy, Cairo University, Egypt

[2]BSc. Faculty of Physical Therapy, Misr University, Egypt;

[3]PhD, Professor of Physical Therapy for Women Health, Faculty of Physical Therapy, Cairo University, Egypt.

[4]PhD, Assistant Professor of Obstetrics and Gynecology, Faculty of Medicine, Zagazig University, Egypt.

[5]Faculty of Physical Therapy, Department of Physical Therapy for Women's Health, Cairo University, Cairo, Egypt.

[6]Faculty of Physical Therapy, Department of Physical Therapy for Woman's Health, Bader University in Assuit (BUA), Assuit, Egypt.

Abstract:

Objective: The aim of the study was to find out the impact of foot reflexology versus acupressure on sleep disturbances and hot flashes in postmenopausal women.

Methods: Fifty-four postmenopausal women suffering from postmenopausal sleep disturbances and hot flashes were randomly allocated into two equal groups: Group A, (n=27) treated by foot reflexology for fifteen minutes, 3 sessions per week for six weeks, and Group B, (n=27) treated by acupressure for twenty-one minutes, 3 sessions per week for six weeks. Sleep quality was evaluated by Pittsburgh Sleep Quality Index, and hot flashes severity by Hot Flashes Questionnaire before and after six weeks of the treatment protocol.

Results: There were statistically significant improvements ($p < 0.05$) in pittsburgh sleep quality index score, and hot flashes questionnaire score in both groups after treatment compared with baseline. When comparing both groups, post-treatment results revealed significant improvements in pittsburgh sleep quality index score, and hot flashes questionnaire score ($p < 0.001$) in favor of group (B).

Conclusion: Both acupressure, as well as foot reflexology were effective therapeutic modality for management of postmenopausal women with superior to acupressure for gained improvements in sleep quality, and severity of hot flashes among postmenopausal women.

Keywords: Acupressure, Foot reflexology, Hot Flashes Questionnaire, Pittsburgh Sleep Quality Index, Postmenopausal.

Manuscript ID: DIJMS-2505-1022 (R1)
DOI: 10.21608/DIJMS.2025.383201.1022

Introduction:

A significant percentage of postmenopausal women experience numerous clinical manifestations, including impaired quality of sleep and a high prevalence of remarkable hot flashes. It has been estimated that the prevalence of hot flashes among postmenopausal women was nearby 30% of women. By 2030, the estimated global postmenopausal women population is projected to reach nearly 1.2 billion.[1,2]

Postmenopausal associated sleep disturbances could affect those women social activities and one's daily positive functioning. The most prevalent menopausal problems are hot flashes, which can also result in sleep disturbances due to nocturnal attacks and sweats. Sleep disorders can manifest at any age, with 35-40% of individuals experiencing sleep issues by the fifth year.[3,4]

Menopause is a natural phase in a woman's life characterized by hormonal shifts that affect both the body and brain, potentially resulting in emotional and physical symptoms. Hormonal changes encompass reductions in estrogen, prolactin, thyroid, as well as parathyroid hormones, with elevations in luteinizing hormone and follicle-stimulating hormone.[5]

Hot flashes manifest in the majority of postmenopausal women. The abrupt appearance of erythema on the scalp, neck, and chest, accompanied by an intense feeling of heat in the body, potentially leading to profuse sweating. Its

duration ranges from several seconds to a few minutes, seldom exceeding one hour. Regarding frequency, it may manifest infrequently or regularly during a duration of several minutes. A hot flash, with a prevalence of 70%, is the most painful symptom related with menopause.[6,7]

Menopausal hot flashes are associated with increased norepinephrine activity in the hypothalamus, leading to a sudden, temporary decrease in the usual thermoregulatory response set point.[8]

A survey of 190 postmenopausal breast cancer survivors aged 40 to 65 revealed that 65% experienced hot flashes, with 37% reporting moderate severity and 34% indicating severe severity. Experiencing hot flashes may diminish a woman's quality of life by impairing sleep quality along with exacerbating fatigue and depression.[2,8]

Sleep problem is highly prevalent and affects between 28% and 63% of postmenopausal women. Sleep in postmenopausal women is altered in ways which may have an adverse effect on health.[9]

Consequently, certain patients and their healthcare providers seek alternative therapies, including relaxation techniques, acupressure, yoga, reflexology, regular exercise, balanced nutrition, herbal supplements, appropriate clothes, as well as frequent showers, which have demonstrated efficacy in alleviating symptoms related to depression.[10]

Where, non-pharmacological therapies include physiotherapeutic treatments, such as exercises, acupressure, biofeedback, heat treatments, transcutaneous electrical nerve stimulation, relaxation techniques, yoga techniques, kinesio taping and myofascial release were safe, and significantly effective in mitigating postmenopausal sleep disturbances, and hot flashes.[11]

Acupuncture as used in traditional Chinese medicine is a safe and non-invasive method. Acupressure is a sort of skill complementary medicine in which fingers are used to press some key points on patients` skin. It might balance vital energy by releasing neurotransmitters and neural hormones that consequently, could improve early menopausal complications, plus a significant reduction in the number of hot flashes.[12]

World health organization (WHO) believes that complementary and alternative medicine may be efficacious in mitigating menopausal symptoms and enhancing women's longevity during this phase. Complementary medicine serves as an alternative to pharmacotherapy, encompassing therapies such as herbal medicine, aromatherapy, massage therapy, vitamins, supplements, music therapy, relaxation techniques, biofeedback, yoga, as well as acupressure.[13]

To available data, a considerable doubt still existed within related medical literature regarding the efficacy of complementary therapeutic interventions currently conducted as alternative modalities with obvious safety for modulating such clinical manifestations among postmenopausal women.

Therefore, current study was conducted to investigate the effect of foot reflexology versus acupressure on sleep disturbance and hot flashes in postmenopausal women.

Methods:

Study Design: this study was a randomized controlled clinical trial. The Institutional Review Board of the Faculty of Physical Therapy at Cairo University [No: P.T.REC/012/005081] granted ethical approval prior to the commencement of the study. It was documented on ClinicalTrials.gov [NO: NCT06499311]. The researchers clarified the study's protocol to each participant and obtained their informed consent to participate. The research adhered to the ethical principles outlined in the Declaration of Helsinki for human subjects. It occurred from January to September 2024.

Participants: postmenopausal women suffering from postmenopausal sleep disturbances and hot flashes were recruited from The Out-patient Clinic of Gynecology department of Diarb Nigm Hospital, ElSharqia, Egypt. Their diagnosis with sleep disturbances and severity of hot flashes were confirmed via accurate history-taking, medical examination and, referral from their gynecologist. The inclusion criteria were; age: 45-55 years, body mass index (BMI): 25-29.9kg/m^2, and suffering from moderate to severe hot flashes assessed by Hot Flashes Questionnaire, also sleep disturbances >5 assessed by self-reporting Pittsburgh sleep quality index. The exclusion criteria included: emotional stress during the past six months, utilization of hormonal replacement therapy for sleep disruptions, mental disorders, circular employment particularly involving night shifts, or sensorineural issues in the foot.

Randomization: each participant was assigned a unique identification number, which facilitated the division of participants into two equally sized groups (n=27). Sequentially numbered index cards were enclosed in opaque envelopes. The researcher unsealed the envelope and assigned the individuals to their respective groups. Subsequent to randomization, no participants withdrew from the study **(Figure 1).**

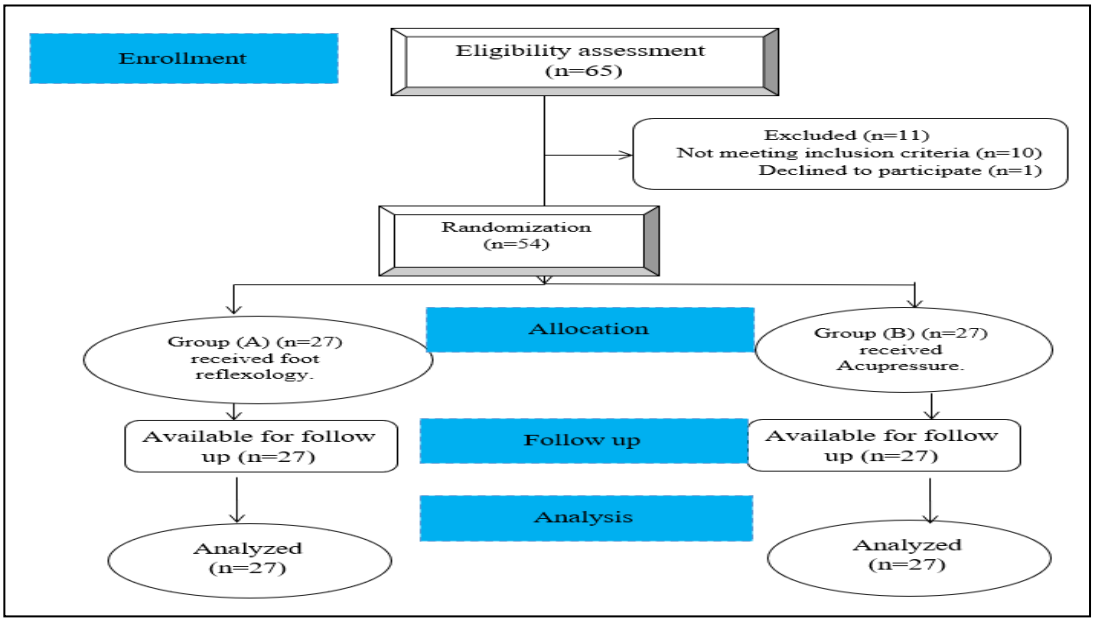

Figure (1): Flow chart for participants` recruitment and allocation

Interventions:

Group A comprised twenty-seven postmenopausal women who were given foot reflexology for 15 minutes, three times weekly for 6 weeks, whereas Group B consisted of twenty-seven postmenopausal women who were given acupressure for 21 minutes, three sessions weekly week for 6 weeks.

Foot Reflexology: all women in group (A) treated by foot reflexology for 15 minutes on both feet, 3 sessions per week for six weeks.[13] Initial each participant received full explanation about purpose, therapeutic and physiological benefits, and procedures, then carefully was checked for any contraindications, and positioned in comfortable supine with targeted feet near to researcher. Feet were cleaned by alcohol, then applied warming up in form of bilateral feet massage through zigzag approach, and big toe gentle pulled (3-5 minutes). Then, the researcher located foot desired points for reflexology technique at the medical border just above the heel. Stimulation of reflex points was associated with the adrenal at the middle of the sole, hypothalamus at the medial edge near the big toe, pituitary glands at the medial base of the big toe, heart at the external distal edge near the little toe, and lung at the middle of the sole via manual pressure at reflexology zone[14] researcher held targeted foot, and pressed sole bending it by researcher left hand, and right researcher thumb directly pressed reflex points/ zone at solar plexus at the foot arch, in a circular and pressurized manner according to participating postmenopausal women tolerance.[13]

Acupressure: all women in group (B) treated by acupressure for 21 minutes on both feet, 3 sessions per week for six weeks.[15] Initial each participant received full explanation about purpose, therapeutic and physiological benefits, and procedures, then carfully was checked for vital signs, and overall temperature, and positioned in comfortable supine with both legs slightly apart with feet at the plinth edge thus permited researcher good vision for feet. Feet were cleaned by alcohol, then applied warming up in form of bilateral feet massage through zigzag approach, and big toe gentle pulled (3-5 minutes). Then, the researcher located foot desired four acupoints 3 points (Shenmen point at wrist crease, Sanyinjiao point; at both feet, and Fengchi point; at hairline within occipital region on dorsal neck surface), bilaterally in addition to one in midline at the apex of nose on centerline among eyebrows ends (Yintang point), for acupressure technique.[16] For Sanyinjiao point, researcher held targeted foot by her left hand, and applied thumb pressure for 3 minutes for Shenmen point, the researcher sat near participants` hand supported with left hand, and thumb of right hand pressed for 3 minutes. For Fengchi point, the researcher asked participant to turned to prone with participant`s face in plinth hole, then researcher detected the Fegchi point at occipital area abd applied thumb pressure for 3 minutes. At last, for Yintang point while participant in supine the researcher determined Yintang point at the nose top on centerline between eyebrews` ends, and applied pressure for 3 minutes.[15]

Outcome measures: Fifty-four participants were assessed at the baseline and after the treatment protocol ended after six weeks.

Outcome measures used were:

Assessment of sleep quality: pittsburgh Sleep Quality Index is a valid, self-report questionnaire and reliable tool widely used for assessment of sleep quality for all postmenopausal women. It consists of 19 subitems, creating

7 components that are available in Arabic version. Each component's scores range from 'zero,' indicating no difficulty, to 'three,' signifying severe difficulty. The component scores are added up to obtain a total score range of zero to twenty-one. Elevated scores signify worse sleep quality. The PSQI has internal consistency and a reliability coefficient (Cronbach's alpha) of 0.83 for its seven components. Numerous studies using the PSQI in a variety of older adult populations internationally have supported high validity and reliability.[17,18]

Assessment of Hot Flashes: king health questionnaire (KHQ) is a valid and reliable measure for severity of hot flashes. This tool is suitably sensitive to negative changes over time, having its cut-points as well minimally important differences serving as a valuable instrument for addressing significant issues related to therapeutic interventions and for monitoring management progress and response on a scale from 0 (no interference) to 10 (complete interference). A cumulative score is calculated by adding up items. Elevated scores signify increased interference with hot flashes, hence indicating a more significant effect on quality of life.[19]

Statistical Analysis:

Sample Size Calculation: the sample size for the present study was determined utilizing the G*power tool (version 3.1.9.2, Heinrich-Heine-University, Düsseldorf, Germany) for a one-tailed test. The sample size calculation employs the Pittsburgh Sleep Quality Index, as detailed in Mondal et al. [17], with an 80% power at an α level of 0.05, including 2 measurements for 2 groups, and an effect size of 0.428, utilizing the F-test MANOVA for repeated measures within and between interactions. The minimum requisite sample size is 50 individuals, with an additional 4 (10%) subjects accounted for as dropouts, resulting in a total sample size of 54 subjects, with 27 in each group. Figure 1 shows the flowchart of participants during the study.

Before the statistical analysis was performed, data exploration was carried out to determine a suitable statistical parametric or non-parametric test. Data were screened for normality assumption, homogeneity of variance, and presence of extreme scores. Shapiro-Wilk and Kolmogrov-smirnov tests for normality showed that Pittsburgh sleep quality index scores, and Hot flashes questionnaire scores were normally distributed ($p > 0.05$). SPSS version 25 was used to conduct analysis, where descriptive statistics was calculated mean, standard deviation (SD) per each group. Inferential statistical analysis using paired t-test to compare pre and post-test reported values and to compare between both groups. Mixed MANOVA was conducted to investigate the effect of treatment on pittsburgh sleep quality index, and hot flashes questionnaire. The level of significance was settled at 0.05.

Results:

The findings of this study demonstrated no significant difference in patientdemographic data, such as age, weight, height, as well as BMI, among groups A and B ($p > 0.05$), suggesting that the two groups are homogeneous (Table 1).

Table (1): Demographic data of participants

Demographics	Group A Mean±SD	Group B Mean±SD	t-value	p-
Age (years)	48.63±2.02	48.59±1.93	0.075	0.405
Weight (kg)	79.56±6.96	77.7±7.39	0.878	0.388
Height (cm)	170.89±2.1	169.89±3.52	1.194	0.243
BMI (kg/m^2)	27.23±1.67	26.87±1.65	0.736	0.469

SD: standard deviation

Effect of treatment on Pittsburgh sleep quality index and Hot flashes questionnaire:

Mixed MANOVA was carried out to find out the impact of treatment on pittsburgh sleep quality index, and hot flashes questionnaire. There was a significant interaction effect of treatment and time ($p = 0.001$). There was a significant main effect time ($p = 0.001$). There was a significant main effect of treatment ($p = 0.006$). (Table 2).

Table (2): Mixed MANOVA for the effect of treatment on Pittsburgh sleep quality index and Hot flashes questionnaire

Mixed MANOVA		
Interaction effect (treatment * time)		
F = 25.48	**p = 0.001**	**S**
Effect of time		
F = 117.89	**p = 0.001**	**S**
Effect of treatment		
F = 4.95	**p = 0.006**	**S**

F value: Mixed MANOVA F value **p value:** Probability value **S:** Significant

Effect of treatment on Pittsburgh sleep quality index (PSQI) values:

No significant difference among both groups' pretreatment (p 0.259), whereas there was statistically significant difference post-treatment (p 0.017) with improvement percentages were 46% for group A, and 51.48% for group B, in favor to group B; table (3).

Effect of treatment on Hot flashes questionnaire (HFQ) values:

No significant difference among both groups' pretreatment (p 0.70), whereas there was statistically significant difference post-treatment (p 0.345) with improvement percentages were 11.85% for group A, and 14.09% for group B, in favor to group B, table (3).

Table (3). Mean outcome measures at pretreatment, posttreatment

Outcome measures	Group A	Group B	t-value	P-value
	Mean ±SD	Mean ±SD		
Pretreatment				
PSQI	16.48 ±1.16	16.85 ±1026	-1.154	0.259
HFQ	68.52±7.74	72.59±9.44	-1.893	0.70
Post treatment				
PSQI	6.82 ±1.3	6.04± 0.939	2.563	0.017
HFQ	56.67±8.77	58.62±7.18	-0.961	0.345
t-value				
PSQI	90.55	11.84		
HFQ	12.74	14.61		
% of change				
PSQI	46%	51.48%		
HFQ	11.85%	13.97%		
p-value	0.001*	0.001*		

SD: standard deviation; **PSQI:** Pittsburgh sleep quality index **HFQ:** Hot flashes questionnaire.

Discussion:

Menopause is a universal midlife physiological event experienced by women, typically associated with decreased estrogen levels.[2] Postmenopausal women often face various hormonal deficiency-related symptoms, including somatic, vasomotor, sexual, and psychological manifestations such as sleep disturbances and hot flashes. The severity of hot flashes may be attributed to increased norepinephrine activity.[6,7] Moreover, sleep disturbances affect approximately 28–63% of postmenopausal women, significantly impacting their overall well-being.[20]

Hormonal therapy is considered an effective treatment for many menopausal symptoms. However, not all women are able or willing to use hormonal interventions.[21] Consequently, this study aimed to explore complementary and non-pharmacological approaches that do not involve drugs or chemicals to alleviate the common symptoms associated with menopause.[22]

Our findings demonstrated statistically significant improvements in the Pittsburgh Sleep Quality Index (PSQI) and hot flash questionnaire scores in both groups (P = 0.001). However, when comparing the groups, Group B (treated with acupressure) showed significantly greater improvement compared to Group A (treated with foot reflexology) (P = 0.001).

These results align with the findings of Lialy et al.[4], who highlighted the possible benefits of reflexology as a supplementary therapy method for improving sleep quality and mitigating sleep disturbances in postmenopausal women.[22] Additionally, improvements in PSQI scores observed in this study are supported by previous clinical trials suggesting that acupressure modulates melatonin levels, brain-derived neurotrophic factors, and serotonin secretion, thereby aiding in sleep disorder management.[23]

Mahdavipour et al.[24] also reported significant therapeutic benefits in a clinical trial where a six-week foot reflexology program (applied twice weekly) improved outcomes in 121 postmenopausal women. Similarly, Aydin et al.[25] found significant reductions in PSQI scores and sleep dysfunction among postmenopausal women receiving foot reflexology.

Regarding hot flashes, our findings align with those of Armand et al.[26], who reported therapeutic benefits of acupressure on hot flash severity in postmenopausal women. Their study also highlighted improvements in anxiety levels, although no significant changes in night sweat severity were noted, consistent with our results.

Abedian et al.[16] further supported the efficacy of acupressure as a safe, non-invasive, self-care therapy. In their randomized clinical trial involving 120 postmenopausal women, acupressure demonstrated significant therapeutic benefits compared to control and sham acupressure groups.

A study by Ozcan et al.[27] revealed that foot reflexology not only improved sleep disturbances but also addressed other complaints like insomnia in postmenopausal women in developing countries. Hadizadeh-Talasaz et al.[28] similarly found that auricular acupressure effectively managed vasomotor and physical symptoms in postmenopausal women, supporting the role of complementary therapies.

Wang et al.[29], in a systematic review as well as meta-analysis, confirmed the efficacy of foot reflexology in improving sleep quality, depression, and anxiety. They emphasized the need for longer follow-up studies with larger populations to generalize findings. Gokbulut et al.[30] further demonstrated that daily foot massage significantly increased sleep duration in postmenopausal women.
Whatley et al.[23] noted that reflexology could influence cerebral activity, potentially enhancing sleep quality. Reflexology may also promote relaxation, leading to improvements in emotional and physical well-being, even when performed with mild pressure. However, Williamson et al.[31] argued that foot massage might serve as a placebo, as no significant mechanism of action for reflexology was identified.
Conversely, Song and Kim.[32] emphasized the benefits of foot reflexology in reducing depression and improving postmenopausal quality of life through elevated serotonin levels and stress modulation.[33]
Finally, our findings differ from Olivera et al.[9], who attributed improvements in postmenopausal symptoms to lifestyle changes rather than reflexology. Their study did not explore the mechanisms underlying reflexology's potential effectiveness

Conclusion:

The current study's findings indicate that the incorporation of both acupressure and foot reflexology is an effective therapeutic modality for managing postmenopausal women, with superior outcomes observed in sleep quality and the severity of hot flashes compared to acupressure alone.

Limitation of This Study:

The small sample population, along with various exclusion criteria, may provide limitations regarding the generalizability of the current investigation, despite the number of recruited participants being adequate according to an a priori power analysis. The current study did not specify participants' socio-demographic characteristics, like occupation, education, income, as well as marital status, which may correlate with the findings. Finally, more objective assessments are crucial for improving accuracy and reducing bias.

Conflict of interest:

The authors confirmed that this article content has no conflict of interest.

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