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Original Research

The Effects of Foot Reflexology Massage on the Sleep Quality of Nurses Working in the Selected Hospitals of Sabzevar University of Medical Sciences

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Abstract

Poor sleep quality has always caused problems for nurses in providing healthcare. Today, foot reflexology massage is considered adjunctive therapy in improving sleep quality. Therefore, this study aimed to evaluate the effects of foot reflexology massage on the sleep quality of nurses. This controlled clinical trial was conducted on 80 nurses working in the selected hospitals of Sabzevar University of Medical Sciences. The nurses meeting the inclusion criteria were selected using the available sampling method and divided into two intervention and control groups, each containing 40 subjects using the permuted block technique. In the intervention group, foot reflexology massage was conducted by each research unit for 12 sessions, each for 30 minutes for six weeks. Both groups performed the Pittsburgh sleep quality index at the beginning of the study and five days after the intervention. Data were analyzed using SPSS 24 using descriptive and deductive tests. The mean sleep score in the control and intervention groups was 9.22±3.30 and 9.90±3.47, which was 9.05±3.35 and 6.97±2.68 after the intervention, indicating a significant difference in reducing the overall score of the intervention group compared to the control ($p=0.000$). Moreover, decreased sleep quality, sleep latency, sleep efficiency, and sleep duration scores were significant after the intervention ($p<0.05$). Based on the results, foot reflexology massage can enhance nurses' sleep quality. Therefore, nurses are advised to utilize it as a valuable and practical approach to improve their sleep quality.

Keywords: Nursing; Foot reflexology; Sleep quality

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Introduction

According to Maslow's hierarchy of needs, sleep and rest are among the most fundamental human needs [1]. The interruption of the sleep-wake cycle causes physical and psychological problems [2] and disruptions in the normal operation of various bodily functions, such as proper physical, mental, emotional, and social functioning [3]. Insomnia is one of the most prevalent sleep disorders, which includes difficulties falling asleep and staying asleep, as well as poor sleep quality that develops despite adequate conditions and opportunities, disrupting daily activities [4].

Professional circumstances are among the environmental elements that might alter the quantity and quality of sleep and interrupt the natural cycle of sleep [5]. Nursing staff, who make up majority of the workforce in Iran's healthcare system, are susceptible to insomnia because of the nature and frequency of their work [6]. The cyclical nature of nursing, including the night shift [7], negatively impacts nurses' work output, physical and mental health, social life, and sleep. As a result, one is less able to cope with stress at work [8]. The patient's safety may be put at risk due to sleep disturbance because it decreases performance, increases medication errors [9], and causes daytime fatigue and drowsiness, affecting daily performance, judgment, mood, and immunity [10]. Numerous studies have confirmed the high prevalence of sleep disorders in nurses. For instance, the Chinese study by Dong et al. (2017) revealed that the percentage of nurses who experience poor sleep quality and suffer from sleep disorders is high (63.9%) [11]. According to Han et al. (2016), sleep disorder due to stress and pressure from the job for nurses, is one of the significant issues affecting nurses' mental health [12]. As a result, the quality of sleep is crucial for maintaining nurses' mental and physical health [13].

Both pharmacological and non-pharmacological intervention are recommended for the treatment of sleep disorders [14]. Pharmaceutical techniques have always had their drawbacks and adverse effects, regardless of advances [15]. Non-pharmacological intervention such as aroma-inhalation therapy, physical-activity programs, and stress-management programs used for enhancing sleep quality [16]. Reflexology is becoming more widely used in complementary and alternative medicine as a result of the limited usage of medicines due to the adverse impacts [17,18]. There is an increasing interest in foot reflexology massage as one of the non-medicinal therapies with low costs, no side effects, and simple application [19]. According to reflexology, diseases are caused by energy blockages in the body, so stimulating the reflex sites breaks up the obstruction and releases the energy [20]. Alternatively, each reflex point corresponds to a specific organ of the body [17]. Activating the neurons in these areas releases tension and stress while readjusting the body's balance [21], which increases blood flow [22] and effectively reduces and controls pain and anxiety by boosting endorphin and enkephalin production [23]. Rambad et al. (2019) showed that reflexology improves the quality of sleep in patients with lymphoma. Many studies have examined the effects of reflexology on the quality of sleep, but they have produced mixed results and recommended further research in this area [24]. According to Alinia et al. (2020), reflex foot massage enhances both the quantity and quality of sleep in patients with burn injuries [25]. Chu (2017) entirely discredited the contribution of reflexology to nurses' improved sleep patterns [26]. Fazlullah et al. (2021) found that reflex foot massage did not impair patients' quality of sleep following heart surgery [27]. Since earlier studies have found conflicting results, it is necessary to conduct this study because sleep plays an essential role in maintaining health, improving work performance, and delivering high-quality services. There has been little research on how foot reflexology massage affects nurses' sleep quality. This study aimed to ascertain the effect of foot reflexology massage on nurses' sleep quality.

Materials and Procedures

An open-label randomized controlled clinical trial was applied in the current study. The study protocol was approved by the Sabzevar University of Medical Sciences ethics committee (the ethical code: IR.MEDSAB.REC.1400.163) and the clinical trial code IRCT20220222054100N1. All nurses who worked in the emergency ward and intensive care units of the selected hospitals belonging to Sabzevar University of Medical Sciences were included. The required sample size for each group was calculated as much as 39 individuals, and the final number for each group was 43 individuals, considering the chance of a 10% dropout. The inclusion criteria were willingness to participate, aging between 22 and 60, a Pittsburgh Sleep Quality Questionnaire score above 5, having healthy legs, no drug history of sleep-inducing medications, no prior experience with reflexology massages in the last 6 months, lack of skin and mental illnesses, lack of addiction to drugs and alcohol, no history of diabetes and gout, no history of blood coagulation diseases and obstructive heart diseases, pregnancy and breastfeeding. Additionally, refusal to continue cooperating, disorders, complications, or particular diseases during the study, going through any emotional crisis like a death or divorce, and reporting an incomplete or abandoned foot reflexology massage program were the exclusion criteria. Pittsburgh Sleep Quality Questionnaire and a demographic data questionnaire were utilized as study instruments. The requested demographic data included age, gender, marital status, education level

and etc. The Pittsburgh Sleep Quality Questionnaire has 19 questions for seven different aspects of sleep, including subjective sleep quality, sleep latency, sleep duration, sleep sufficiency, sleep disturbance, use of sleep medication, and daytime dysfunction. The overall score of this instrument ranges from 0 to 21. Poor sleep quality is indicated by a total score of 5 or higher [28]. This survey's sensitivity and specificity are both 100%, and its Cronbach's alpha coefficient is 0.89 [29]. Ten professors from Sabzevar University of Medical Sciences confirmed the content validity of this instrument in the current study, and its Cronbach's alpha coefficient was estimated to be 0.73. Sampling was carried out using the available technique between April 20, 2022, and August 30, 2022. A total of 40 participants from each group remained after six persons withdrew throughout the experiment after being randomly assigned to two control and intervention groups using permutation blocks and entering the study based on the inclusion and exclusion criteria. Both groups completed the Pittsburgh demographic and sleep quality questionnaires after receiving written informed consent. Nurses were given face-to-face instruction by the researcher on how to administer foot reflexology massages to the test group and only had to perform the intervention once while the researcher was present. Each of the study units gave a foot reflexology massage to each participant in the test group for 30 minutes (15 minutes for each foot) before bedtime over six weeks (12 sessions). Continuous and mild pressure is administered to the limit of the person's tolerance, utilizing the middle part of the first joint of the index fingers and thumb for 10 minutes, 15 minutes dedicated to a particular massage, and 5 minutes of general foot massaging.

The massage was performed in three stages: beginning, stimulating the reflex points, and finishing. Stretching and massaging were used in the initial stages of the general foot massage to warm, calm, and prepare the foot for stimulating the reflex spots. The thumb was then used to apply pressure of roughly 3 to 5 kg for 5 to 10 s to the solar plexus, pineal gland, and brain point. The massage is completed by making a gentle stroke from the heel to the toes with the thumbs of both hands to spread the toes apart and relax the foot [30]. Phone follow-up was done to make sure the

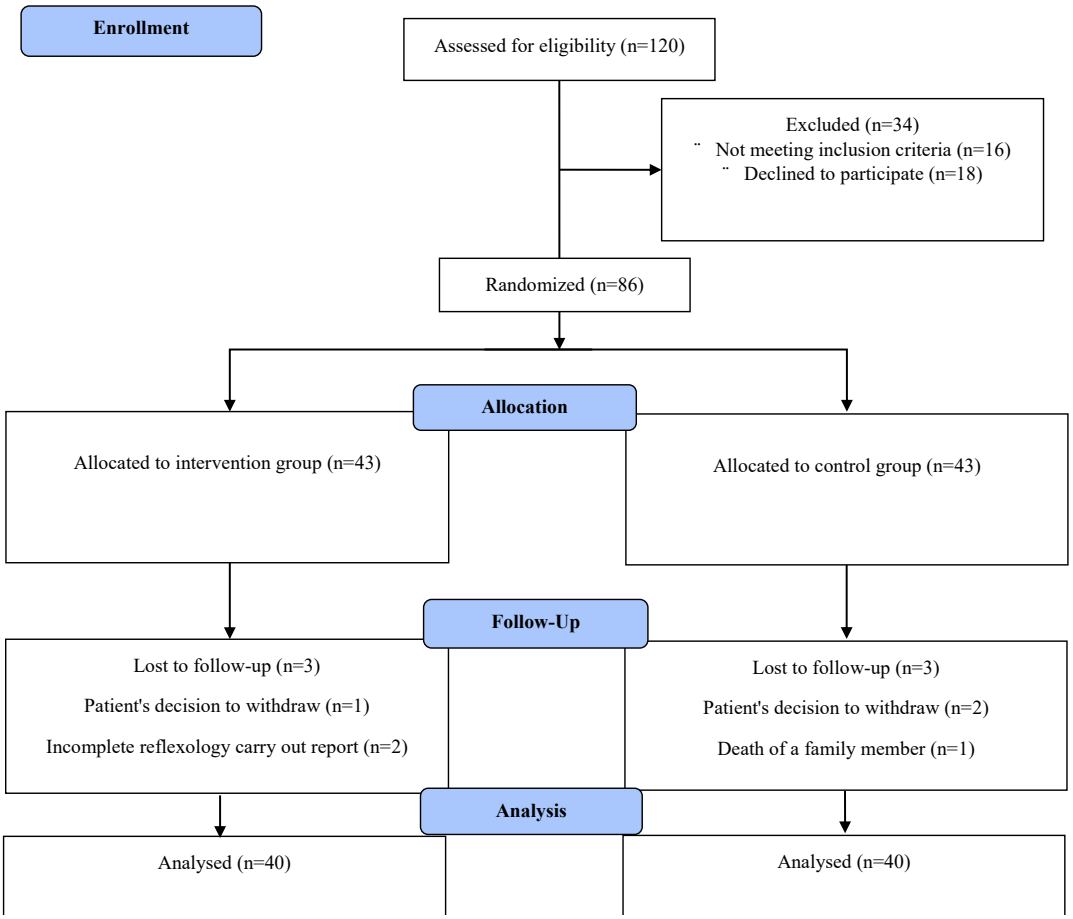

Figure 1. Clinical trial flowchart

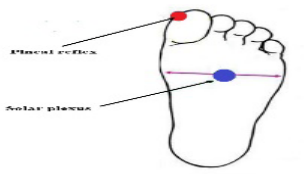

Figure 2. Reflex points

intervention was performed correctly. In the control group, the participants did not receive any type of intervention.

The Pittsburgh Sleep Quality Questionnaire was again completed by the subjects five days after the intervention ended. The data were collected and then analyzed using SPSS software version 24. This study expressed qualitative factors as numbers; whereas quantitative variables were described as mean (standard deviation) (percentage). Chi-square and independent t-tests were used to compare the demographic data, and independent t, paired t, and covariance tests were employed to compare the variations between the two test and control groups.

Results

This study sought to ascertain the effect of foot reflex massage on nurses' sleep efficiency. The research units were, on average, 33.25±6.56 and 33.22±6.14 years old in the control and intervention groups, respectively. The majority of participants in the two groups were married women with bachelor's degrees. In addition, the vast majority of those in the two groups were classified as employees. Data analysis did not find a significant difference between the two groups in terms of demographic factors (P>0.05). Table 1 displays further findings and outcomes based on demographic data.

The average sleep quality score in the control and intervention groups before the intervention was 9.22±3.30 and 9.90±3.47, respectively, indicating no significant difference (P=0.37). Following the intervention, the average sleep quality score was 9.05±3.35 for the control group and 6.97±2.68 for the intervention group (P=0.00). The results of the paired t-test for the intra-group comparison revealed no significant difference between the average sleep quality score of the research units in the control group before and after the intervention (P=0.62). A significant difference was found in the intervention group (P=0.00) in the comparison of the average sleep quality score by paired t-test before and after the intervention. A significant difference was observed between the two groups using the covariance test (P=0.00) in the comparison of the average sleep quality score between the control and intervention groups after the intervention. In addition, there was a significant difference between the intervention group's average scores subjective sleep quality, sleep latency, sleep sufficiency, and sleep duration, as much as 0.77±0.65, 1.35±0.80, 0.80±0.85, and 1.05±0.81, respectively, after the intervention (P<0.05), and the control group's average scores, as much as 1.50±0.93, 1.42±0.84, 1.65±1.05, and 1.62±1.00, respectively. The paired t-test for the intra-group comparison revealed a significant drop in the test group's average ratings for subjective sleep quality, sleep latency, sleep sufficiency, and sleep duration (P<0.05), but not significant in the control group. The paired t-test revealed no significant difference in the two groups on the average score for sleep disorder and daytime dysfunction (P>0.05). Additionally, there was no significant difference between the two groups (P>0.05) when the average score of the components of daytime dysfunction and sleep disorder was compared in the control and intervention groups after the intervention. Moreover, a comparison between the two groups or within each group did not show statistical significance for the intervention's component measuring sleep medication use between the two groups (P>0.05). Table 2 contains the findings of the analysis comparing several aspects of sleep quality.

Discussion and Conclusion

The results showed a significant difference between the intervention group and the control group regarding the overall sleep quality score, subjective sleep quality, sleep latency, sleep sufficiency, and sleep duration following the administration of a foot reflexology massage. Therefore, foot reflexology massage was efficient in raising the research units' sleep quality in light of the acquired data.

Reflexology has been shown in numerous studies with statistical populations and various samples to be effective in enhancing sleep quality and eradicating sleep disorders [31,32]. Reflexology reduces the activity of the sympathetic and neuroendocrine systems. Reflexology also modifies the autonomic nerves, lowering pain and tension, heart rate, blood pressure, and pain by releasing endorphins from the brain [24]. In previous studies, foot reflexology was used as a method of massage therapy to examine sleep quality. However, the most significant difference lies in the statistical population of the research. For instance, Abedini et al. (2022) revealed that reflex foot massage can enhance colorectal cancer patients' sleep quality [28]. As a result, the results of this study were consistent with those of the current study. However, in Abedini et al., all sleep-related variables in the test group improved after receiving a foot reflexology massage. There may be an explanation for this difference in the study population and the intervention method. Additionally,

Table 1. Demographic characteristic of the participants

Variable	Category	Intervention group	Control group	P value
Age	--	33.22 ±6.14	33.25 ±6.56	0.986 Chi-square
Gender	Male Female	8 (20.0%) 32 (80.0%)	12 (30.0%) 28 (70.0%)	0.302 Chi-square
Marital Status	Single Married Divorced	8 (20.0%) 31 (77.5%) 1 (2.5%)	7 (17.5%) 33 (82.5%) 0	0.569 Chi-square
Education Level	BSc MSc	39 (97.5%) 1 (2.5%)	37 (92.5%) 3 (7.5%)	0.305 Chi-square
Number of Children	0 1 2 3	16 (40.0%) 15 (37.5%) 9 (22.5%) 0	16 (40.0%) 12 (30.0%) 8 (20.0%) 4 (10.0%)	0.222 Chi-square
Economic Status	Sufficiently Less than enough More than enough	19 (47.5%) 20 (50.0%) 1 (2.5%)	15 (37.5%) 23 (57.5%) 2 (5.0%)	0.603 Chi-square
Underlying diseases	No Diseases Hypothyroidism Nephrolithiasis Lumbar disc herniation	39 (97.5%) 1 (2.5%) 0 0	37 (92.5%) 1 (2.5%) 1 (2.5%) 1 (2.5%)	0.562 Chi-square
Drug history	No Yes	39 (97.5%) 1 (2.5%)	39 (97.5%) 1 (2.5%)	1.00 Chi-square
History of corona virus	Yes No	28 (70.0%) 12 (30.0%)	24(60.0%) 16 (40.0%)	0.348 Chi-square
Tobacco usage	Yes No	0 40 (100%)	1 (2.5%) 39 (97.5%)	0.314 Chi-square
Drug usage	Yes No	0 40 (100%)	0 40 (100%)	--
Hospital	Heshmatieh Shahid Beheshti Vasei	17(42.5%) 10 (25.0%) 13 (32.5%)	15 (37.5%) 14 (35.0%) 11 (27.5%)	0.619 Chi-square
Clinical service department	CCU ICU Emergency	9 (22.5%) 15 (37.5%) 16 (40.0%)	5 (12.5%) 16 (40.0%) 19 (47.5%)	0.489 Chi-square
Job status	Permanent staff Agreement-based Contractual Intern	25 (62.5%) 4 (10.0%) 5 (12.5%) 6 (15.0%)	24 (60.0%) 5 (12.5%) 6 (15.0%) 5 (12.5%)	0.958 Chi-square
Number of shifts per month	10-20 20-30 30-40	10 (25.0%) 25 (62.5%) 5 (12.5%)	10 (25.0%) 24 (60.0%) 6 (15.0%)	0.946 Chi-square
Number of night Shifts per month	<5 5-10 >10	7 (17.5%) 33 (82.5%) 0	10 (25.0%) 33 (82.5%) 1 (2.5%)	0.584 Chi-square
Work history	<5 years 5-10 years 10-15 years 15-20 years 20-25 years	11 (27.5%) 9 (22.5%) 15 (37.5%) 3 (7.5%) 2 (5.0%)	10 (25.0%) 13 (32.5%) 9 (22.5%) 6 (15.0%) 2 (5.0%)	0.513 Chi-square

Table 2. Comparison of the mean scores of sleep quality and its components in the control and intervention groups before and after the intervention

Variables	Group	Before intervention (Independent t-test)	After intervention (Covariance)	P value (Paired t-test)
Subjective sleep Quality	Control	1.3±0.82	1.50±0.93	0.07
	Intervention	1.32±0.76	0.77±0.65	0.00
	P value	0.88	0.00	
Sleep latency	Control	1.57±0.81	1.42±0.84	0.057
	Intervention	1.77±0.89	1.35±0.80	0.00
	P value	0.29	0.04	
Sleep duration	Control	1.75±0.98	1.62±1.00	0.13
	Intervention	1.77±0.99	1.05±0.81	0.00
	P value	0.91	0.00	
Sleep sufficiency	Control	1.55±1.13	1.65±1.05	0.48
	Intervention	1.62±1.19	0.80±0.85	0.00
	P value	0.77	0.00	
Sleep disturbance	Control	1.25±0.54	1.10±0.54	0.057
	Intervention	1.30±0.56	1.17±0.63	0.058
	P value	0.68	0.69	
Use of sleep Medication	Control	0.25±0.63	0.30±0.56	0.57
	Intervention	0.27±0.75	0.20±0.68	0.083
	P value	0.87	0.17	
Daytime Dysfunction	Control	1.55±1.13	1.45±1.15	0.37
	Intervention	1.82±1.03	1.62±0.92	0.10
	P value	0.26	0.85	
Total sleep quality	Control	9.22±3.30	9.05±3.35	0.62
	Intervention	9.90±3.47	6.97±2.68	0.00
	P value	0.37	0.00	

the sample size was different from that of the current study. According to Aydin et al. (2021), reflex foot massage enhances postmenopausal women's sleep quality [33]. In the study discussed above, the intervention protocol was conducted in twelve 30-minute sessions, as in the present study, but the study group was unisex, and there was a different intervention protocol. The reflex foot massage was found to improve lymphoma patients' sleep quality by Rambad et al. (2019) [24], but the test group's patients experienced less of a decline in their sleep quality score than those in the current investigation, which could be related to the short duration of the interventions, the short follow up period, chemotherapeutic medications used, and the malignant nature of the illness. Sajjadi et al. (2020) demonstrated that foot reflexology is a quick and efficient nursing intervention to improve sleep quality and reduce physical exhaustion and anxiety in patients with multiple sclerosis [34]. However, the impact of foot reflexology was not assessed when it came to sleep components. Zengin and Aylaz (2019) showed that reflexology massage and sleep hygiene education are beneficial in enhancing sleep quality and decreasing fatigue in chemotherapy patients [35]. The overall impact of reflexology massage on sleep quality and exhaustion is unknown due to the relationship and timing of sleep hygiene instruction in this study, but it is compatible with the present study regarding its beneficial effects on sleep quality. Additionally according to a systematic review from 2021, this massage is a non-invasive, cozy, and supplementary technique to enhance sleep quality for persons with sleep disorders [36]. Fazlullah et al. (2021), which contrasted with those of the present investigation, showed that foot reflexology did not affect lowering delusions or raising patients' sleep quality following heart surgery [27]. This variation can be explained by variations in the study population, sample size, and length of the intervention [28]. In addition, this study was carried out on patients who were eligible for heart surgery and may continue to experience sleep disorders due to factors like the inherent nature of the intensive care unit (ICU) environment, the effects of medications, physical harm from the ventilator, loss of mobility, and increased social isolation. As the majority of studies conducted in this field indicated that reflex foot massage is helpful in improving the sleep quality of different people, this study confirmed the beneficial effects of foot reflexology massage on nursing staff sleep quality. The small sample size is one of the study's limitations. Therefore, further research with larger sample sizes and longer follow-ups with

other populations is advised for better generalization of the findings.

As a support intervention, foot reflexology massage has successfully enhanced nurses' sleep quality. This massage is regarded as an easy, accessible, safe, and cost-free nursing intervention that can be carried out both at home and in medical facilities. Unlike pharmaceutical treatments, complementary and alternative medicine does not have any side effects. As a result, nursing professionals with sleep difficulties are advised to use it as a supplemental treatment.

Conflict of Interests

The authors have no relevant financial or non-financial interests to disclose.

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