

Foot Massage Therapy for Sleep Pattern Disorders in Hypertensive Patient: A Case Study

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ABSTRACT

Background: Hypertension is a cardiovascular disease characterized by a persistent increase in systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg. Uncontrolled hypertension may disrupt cardiovascular and autonomic nervous system regulation, leading to reduced sleep quality and quantity, including difficulty initiating sleep, frequent nocturnal awakenings, and inadequate sleep duration. **Objective:** To describe nursing care for a patient with a sleep pattern disorders associated with hypertension through the implementation of foot massage at Bangil Regional General Hospital, Pasuruan Regency. **Methods:** This study employed a case study design involving a single patient with hypertension and a sleep pattern disorders. The intervention consisted of foot massage for 15–20 minutes, administered twice daily for three consecutive days, accompanied by education on limiting high-sodium foods and caffeinated beverages. **Results:** After three days of intervention, reductions were observed in complaints of difficulty sleeping, frequent awakenings, sleep dissatisfaction, and altered sleep patterns. Sleep duration increased from approximately 3 hours to 6 hours per night. The patient was able to return to sleep more easily after awakening, with improved activity performance, reduced yawning frequency, and more relaxed eyes. Blood pressure decreased to 145/96 mmHg, with a pulse rate of 99 beats/minute. **Conclusion:** Foot massage was effective in improving sleep quality and quantity and in managing a disturbed sleep pattern in a patient with hypertension. This intervention may be used as a complementary nursing therapy to enhance patient comfort and improve rest quality.

Keywords: Hypertension; Foot Massage; Sleep Disorders; Case Study

Background

Hypertension is a noncommunicable disease characterized by a persistent increase in systolic blood pressure of ≥ 140 mmHg and/or diastolic blood pressure of ≥ 90 mmHg. This condition is influenced by various factors, such as age, genetics, stress, an unhealthy diet, obesity, and lack of sleep. Uncontrolled hypertension can disrupt the regulation of the cardiovascular and autonomic nervous systems, leading to a decrease in sleep quality and quantity, such as difficulty falling asleep, frequent awakenings during the night, and inadequate sleep duration (1)(2).

Sleep pattern disorders are common among patients with hypertension, with a global prevalence of approximately 50–65% (3)(4). In Indonesia, the prevalence of hypertension among residents aged ≥ 18 years reached 29.2% in 2023, while in East Java Province it stood at 32.8%. Pasuruan Regency had a higher prevalence of 34.3%, exceeding the national average (5). Medical records from Bangil Regional General Hospital showed that there were 105 inpatients with hypertension between January and December 2025. A preliminary study conducted on March 26, 2026, found that two out of five patients with hypertension experienced sleep disorders.

Hypertension is frequently associated with sleep pattern disorder, which is one of the common nursing problems experienced by patients with hypertension (6). Patients commonly experience difficulty initiating sleep, frequent nocturnal awakenings, shortened sleep duration, difficulty returning to sleep after awakening, non-restorative sleep, fatigue, and decreased daytime functioning (7). Sleep disturbances not

only reduce patients' quality of life but may also contribute to poor blood pressure control. The relationship between hypertension and sleep disorders is bidirectional, whereby hypertension contributes to impaired sleep, while inadequate sleep further aggravates blood pressure dysregulation and increases the risk of cardiovascular complications (8)(9).

The pathophysiological relationship between hypertension and sleep pattern disorder involves complex neurohumoral and vascular mechanisms. Persistent hypertension is associated with sympathetic nervous system overactivity, resulting in excessive catecholamine release, increased heart rate, peripheral vasoconstriction, and sustained elevation of blood pressure, particularly during the night. Chronic activation of the hypothalamic–pituitary–adrenal axis also increases cortisol secretion, prolonging physiological stress responses that interfere with normal sleep initiation and maintenance (10). Furthermore, endothelial dysfunction, impaired baroreceptor sensitivity, vascular stiffness, and disruption of the normal nocturnal blood pressure dipping pattern contribute to autonomic imbalance and impaired sleep regulation (11). Consequently, reduced parasympathetic activity and persistent sympathetic activation lead to prolonged sleep latency, fragmented sleep, frequent nocturnal awakenings, inadequate sleep duration, and poor sleep quality in patients with hypertension. Recent evidence has confirmed that sympathetic overactivity and autonomic dysregulation are key mechanisms linking hypertension with sleep abnormalities and adverse cardiovascular outcomes (12).

The management of hypertension includes pharmacological and nonpharmacological therapies. One complementary intervention that can be applied is a 15–20-minute foot massage to promote relaxation and address sleep pattern disorders in patients with hypertension (13)(14). Foot massage is one of the complementary nursing interventions that has been reported to improve sleep quality in patients with hypertension. Gentle massage applied to the feet stimulates cutaneous mechanoreceptors and sensory nerve endings, thereby enhancing parasympathetic nervous system activity while suppressing sympathetic nervous system activity (15). This physiological response promotes muscle relaxation, improves peripheral blood circulation, reduces stress hormone secretion, and increases the release of serotonin and endorphins, facilitating sleep initiation and improving sleep continuity. Previous studies have demonstrated that foot massage improves sleep quality and contributes to blood pressure reduction among patients with hypertension. These findings support the use of foot massage as a complementary nursing intervention for managing sleep pattern disorder (16).

This study aims to describe nursing care for sleep pattern disorders in patients with hypertension through the use of foot massage at Bangil Regional General Hospital in Pasuruan Regency. The results of this study are expected to contribute to the advancement of nursing science and support the use of foot massage as a complementary nursing intervention for patients with hypertension who experience sleep disorders.

Methods

This study employed a descriptive case study design to describe the nursing care provided to a patient with hypertension experiencing sleep pattern disorders through the implementation of foot massage as a complementary nursing intervention. The nursing process consisted of assessment, nursing diagnosis, intervention, implementation, and evaluation. The study was conducted in the Anggrek Inpatient Ward of Bangil Regional Hospital, Pasuruan Regency, Indonesia, from April 21 to April 23, 2026.

The participant was selected using purposive sampling based on the inclusion criteria of having a medical diagnosis of hypertension and meeting at least 80% of the major diagnostic indicators for Sleep Pattern Disorder (D.0055) according to the Indonesian Nursing Diagnosis Standards (17). The patient had a history of hypertension for approximately two years and presented with complaints of difficulty initiating sleep, frequent nocturnal awakenings, inadequate sleep duration, sleep dissatisfaction, fatigue, and decreased daily activity. Written informed consent was obtained from the participant prior to data collection.

The nursing intervention of foot massage is performed using reflexology techniques on four points on the foot: the base of the big toe, the area under the little toe, under the base of the index, middle, and ring fingers, then massaging and pressing the area around the center of the sole. The massage is performed for 15–20 minutes, twice daily, in the morning and evening, using olive oil.

Data were collected through comprehensive nursing assessment, including interviews, physical examination, direct observation, and review of the patient's medical records. Sleep outcomes were evaluated using the indicators of the Indonesian Nursing Outcome Standards for sleep pattern, rather than a standardized questionnaire (18). The evaluation focused on clinically observable nursing outcome indicators, including difficulty initiating sleep, frequency of nocturnal awakenings, ability to return to sleep after awakening, total sleep duration, sleep satisfaction, adequacy of rest after sleep, and ability to perform daily activities. These indicators were assessed before the intervention and re-evaluated daily throughout the three-day nursing care period to monitor changes in the patient's sleep pattern.

Results

A 49-year-old female patient (Mrs. E) was admitted to the Orchid Ward of Bangil Regional General Hospital, Pasuruan Regency, with a medical diagnosis of hypertension. During the initial assessment, the patient reported difficulty initiating and maintaining sleep, altered sleep patterns, and a sleep duration of approximately 3 hours per night. She frequently awoke during the night, typically falling asleep at 11:00 PM and awakening at 2:00 AM, after which she experienced difficulty returning to sleep. The patient also reported dissatisfaction with sleep quality, inadequate rest, and decreased ability to perform daily activities. She stated that she had been diagnosed with hypertension approximately two years earlier and had a family history of hypertension in her father. In addition, the patient reported habitual consumption of high-sodium foods, including salted eggs, salted fish, crackers, canned foods, packaged chili sauce, and salty snacks. She also frequently consumed coffee and had not yet been able to limit or avoid these dietary habits.

Physical examination revealed that the patient appeared weak, with a blood pressure of 175/100 mmHg and a pulse rate of 100 beats/minute. The patient's eyes appeared fatigued, with noticeable eye bags and dark circles under the eyes, and she frequently yawned. Based on the subjective and objective findings, a nursing diagnosis of sleep pattern disorders related to inadequate sleep control was established.

Nursing interventions included sleep support and the application of foot massage therapy for 15–20 minutes twice daily, during the daytime and before nighttime sleep, for three consecutive days using olive oil. The massage was administered to the base of the great toe, the area beneath the little toe, the areas beneath the bases of the second, third, and fourth toes, and the central region of the sole. The patient also received education regarding the reduction of high-sodium food intake, limitation of caffeinated beverages, and adherence to a regular sleep schedule. Throughout the intervention period, the patient remained cooperative and appeared relaxed.

Evaluation on the first day showed slight improvement in sleep. The patient reported persistent difficulty sleeping and altered sleep patterns but was able to sleep for approximately 4 hours. Episodes of nighttime awakening decreased slightly. The patient slept at 10:00 PM, awoke at 2:00 AM, and was able to return to sleep after approximately 30 minutes. Feelings of sleep dissatisfaction and inadequate rest persisted but were less severe. Activity tolerance remained reduced. The patient still appeared weak, with a blood pressure of 168/99 mmHg and a pulse rate of 98 beats/minute. Although eye fatigue remained evident, slight improvement was observed. Eye bags and dark circles were still present, and the patient continued to yawn frequently. These findings indicated that the sleep pattern disorders had not yet been resolved.

On the second day, the patient reported a further reduction in difficulty sleeping and improvement in sleep patterns. Sleep duration increased to approximately 5 hours per night. Nighttime awakenings decreased, and the patient slept at 9:30 PM, awoke at 2:30 AM, and returned to sleep within approximately 10–15 minutes. Sleep satisfaction and perceived rest improved, while activity performance increased moderately. The patient's general condition was better, with a blood pressure of 155/98 mmHg and a pulse rate of 99 beats/minute. The eyes appeared less fatigued, eye bags were reduced, dark circles became less prominent, and the frequency of yawning decreased. These findings indicated that the sleep pattern disorders was partially resolved.

On the third day, the patient reported a marked reduction in difficulty sleeping and improvement in sleep patterns. Total sleep duration increased to approximately 6 hours per night. Nighttime awakenings decreased further, with the patient sleeping at 9:00 PM, awakening at 3:00 AM, and returning to sleep

within approximately 5 minutes. Sleep satisfaction improved, perceived rest was adequate, and daily activity performance became more optimal. The patient's general condition was good, with a blood pressure of 145/96 mmHg, a pulse rate of 99 beats/minute. The eyes appeared more relaxed and no longer showed signs of fatigue. Eye bags were no longer observed, dark circles were minimal, and yawning occurred infrequently. These findings indicated that the sleep pattern disorders had been resolved.

Discussion

Sleep Sleep pattern disorders are frequently observed among patients with hypertension and are associated with persistent activation of the sympathetic nervous system, impaired autonomic regulation, and vascular dysfunction. Continuous sympathetic stimulation increases the secretion of catecholamines and cortisol, resulting in elevated heart rate, peripheral vasoconstriction, and sustained nocturnal blood pressure (19). These physiological alterations interfere with the normal sleep cycle by reducing parasympathetic activity, prolonging sleep latency, increasing nocturnal awakenings, and decreasing overall sleep duration and sleep quality (3). This mechanism is consistent with the condition observed in Mrs. E, who experienced difficulty initiating sleep, frequent nighttime awakenings, inadequate sleep duration of approximately three hours per night, fatigue, decreased activity performance, and sleep dissatisfaction before the nursing intervention. These findings fulfilled the major diagnostic indicators of Sleep Pattern Disorder according to the Indonesian Nursing Diagnosis Standards (17). The patient's history of hypertension, frequent consumption of high-sodium foods, and habitual coffee intake may also have contributed to persistent sympathetic activation and poor blood pressure control, thereby aggravating sleep disturbances.

Foot massage was selected as a complementary nursing intervention because it is simple, inexpensive, non-invasive, and can easily be incorporated into routine nursing care. Physiologically, gentle stimulation of the plantar surface activates cutaneous mechanoreceptors that transmit sensory impulses to the central nervous system, promoting parasympathetic nervous system activity while suppressing sympathetic nervous system activity (20). This autonomic modulation induces muscle relaxation, improves peripheral circulation, decreases stress hormone secretion, and promotes the release of endorphins and serotonin, thereby facilitating sleep initiation and improving sleep continuity. These physiological responses are particularly beneficial for patients with hypertension, whose sleep disturbances are strongly associated with autonomic imbalance and persistent cardiovascular activation. Recent studies have also demonstrated that foot massage contributes to improved sleep quality and blood pressure regulation through enhanced relaxation and improved autonomic function (21).

Following three consecutive days of foot massage administered for 15–20 minutes twice daily, Mrs. E demonstrated progressive improvement in both sleep quality and sleep quantity. Sleep duration increased from approximately three hours to six hours per night, nighttime awakenings became less frequent, the patient was able to return to sleep more rapidly after awakening, and sleep satisfaction improved (2). Furthermore, the patient reported feeling more rested upon waking, daily activity performance improved, and physical signs of fatigue, including eye bags, dark circles, and frequent yawning, gradually diminished. Blood pressure also decreased from 175/100 mmHg at baseline to 145/96 mmHg on the third day of intervention. Although blood pressure reduction was not the primary outcome of this study, these clinical improvements indicate that enhanced relaxation following foot massage may have contributed to better autonomic regulation and improved overall physiological recovery (6).

The findings of this case study are consistent with the randomized controlled trial conducted which demonstrated that foot massage significantly improved sleep quality while reducing systolic and diastolic blood pressure in women with essential hypertension (3). In that study, participants receiving repeated foot massage sessions exhibited significant improvements in Pittsburgh Sleep Quality Index scores and blood pressure compared with the control group, suggesting that massage therapy effectively enhances autonomic balance and promotes restorative sleep (6). Although the present study involved only a single patient and evaluated outcomes descriptively using nursing outcome indicators rather than standardized questionnaires, the observed improvements in sleep duration, sleep continuity, and perceived rest are comparable with those reported in the randomized trial.

The present findings also support previous literature reviews that identified foot massage as an effective complementary intervention for improving sleep quality among individuals with hypertension

and other chronic diseases (16)(22). Foot reflexology significantly improved sleep quality in patients with systolic heart failure by promoting relaxation and reducing physiological stress. Foot massage improved sleep quality among patients with congestive heart failure through reductions in peripheral edema and enhancement of patient comfort. Although these studies involved different patient populations, their findings consistently suggest that massage therapy exerts beneficial effects on sleep through common physiological mechanisms involving autonomic regulation, improved circulation, and relaxation (2).

The results of this case study are also consistent with more recent evidence indicating that foot massage remains a promising complementary intervention for patients with hypertension. Foot massage significantly improved sleep quality while reducing blood pressure and heart rate among individuals with hypertension, indicating beneficial effects on cardiovascular and autonomic function (3). Likewise, a recent evidence-based nursing case study demonstrated that daily foot massage improved sleep quality, reduced nighttime awakenings, and lowered blood pressure in an older adult with hypertension, supporting its feasibility for routine nursing practice. These findings strengthen the present case study by demonstrating that the observed clinical improvements are consistent with recent evidence supporting the use of foot massage as a complementary nursing intervention (6).

Conclusions and Recommendations

This case study demonstrated that the implementation of foot massage as a complementary nursing intervention was associated with improvements in the sleep pattern of a patient with hypertension. Following three consecutive days of intervention, the patient showed increased sleep duration, fewer nocturnal awakenings, improved ability to return to sleep after awakening, greater sleep satisfaction, and a reduction in blood pressure. These findings indicate that foot massage may support improvements in sleep pattern outcomes in this individual and may be considered as a complementary nursing intervention for patients with hypertension experiencing sleep pattern disorders. Further studies involving larger sample sizes, controlled research designs, longer intervention periods, and standardized sleep assessment instruments are recommended to strengthen the evidence regarding the role of foot massage in improving sleep quality among patients with hypertension.

Ethical Consideration and Competing Interest

In terms of research ethics, this study received ethical approval from the Health Research Ethics Committee (KEPK), Faculty of Nursing, Universitas Jember, No. 141U/N25.1.14/KEPK/2026. Informed consent was obtained from the patient before data collection and intervention. Patient confidentiality and privacy were maintained by ensuring that personal identification was not disclosed in the report. There is no conflict of interest related to this publication.

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References

1. Nastiti AD, Kusuma E, Puspitasari R. H. Pemberdayaan Kader Posyandu Lansia dalam Upaya Pencegahan Hipertensi dan Komplikasinya. *J Kreat Pengabd Kpd Masy*. 2022;5(1):69–74. <https://doi.org/10.33024/jkpm.v1i1.5280>
2. Arbianto WA, Adriani P. Pemberian Intervensi Pijat Refleksi Kaki Pada Lansia Dengan Hipertensi Yang Mengalami Masalah Gangguan Pola Tidur Di PPSLU Dewanata Cilacap. *J Vent*. 2023;1(4):170–6. <https://doi.org/10.59680/ventilator.v1i4.683>
3. Arslan G, Ceyhan Ö, Mollaoğlu M. The influence of foot and back massage on blood pressure and

- sleep quality in females with essential hypertension: a randomized controlled study. *J Hum Hypertens*. 2021;35(7):627–37. <https://doi.org/10.1038/s41371-020-0371-z>
4. Alle LFN, Aty YMBV, Selasa P, Srinurwela T, Romana AB. Efektifitas Terapi Pijat Refleksi Kaki (Foot Massage) terhadap Kualitas Tidur Pasien dengan Hipertensi. *SEHATRAKYAT (Jurnal Kesehatan Masyarakat)* [Internet]. 2025;4(3):556–69. <https://doi.org/10.54259/sehatrakyat.v4i3.4787>
5. Badan Kebijakan Pembangunan Kesehatan KKR. Survei Kesehatan Indonesia (SKI). Survei Kesehatan Indones Tahun 2023. 2023;1–926.
6. Widyaningrum R, Ulum THM, Yulianti AD. A Literature Review: Effectiveness of Swedish Foot Massage Therapy on Quality of Sleep in Elderly with Essential Hypertension. *Dis Prev Public Heal J*. 2023;17(2):134–40. <https://doi.org/10.12928/dpphj.v17i2.7627>
7. Bakavoly ME, Sajjadi M, Ghasemi R, Ajamzibad H. Comparison of the Impacts of Benson Relaxation Technique and Foot Reflexology Massage on Sleep Quality of Patients with Systolic Heart Failure: A Randomized Clinical Trial. *Iran J Nurs Midwifery Res*. 2023;28(4):448–54. <https://doi.org/https://doi.org/10.4103/ijnmr.ijnmr>
8. Karokaro TM, Hayati K, Masitah TD. Pengaruh Foot Massage Dan Progressive Muscle Relaxation Terhadap Kualitas Tidur Pada Pasien Congestive Heart Failure (CHF) Di Rumah Sakit Grandmed Lubuk Pakam. *J Kesehatan Masy Gizi*. 2023;6(1):137–44. <https://doi.org/https://doi.org/10.35451/jkg.v6i1.1905>
9. Martani AP, Indrawati N. Swedish Foot Massage Untuk Menurunkan Nyeri Kepala Dan Tekanan Darah Pada Pasien Hipertensi: Case Report. 2025;3(3):325–32. <https://doi.org/https://doi.org/10.62085/ajk.v3i3.192>
10. Pasyar N, Rambod M, Najafian Z, Nikoo MH, Yoosefinejad AK, Salmanpour M. The Effect of Foot Reflexology on Fatigue, Sleep Quality, Physiological Indices, and Electrocardiogram Changes in Patients with Acute Myocardial Infarction: A Randomized Clinical Trial. *Iran J Nurs Midwifery Res*. 2024;29(5):608–16. <https://doi.org/https://doi.org/10.4103/ijnmr.ijnmr> 310 23
11. Solehati T, Hermayanti Y, Kosasih CE, Fadillah JF, Ayu R, Juniar S, et al. Pengaruh Teknik Pemijatan Terhadap Kualitas Tidur Pasien Penyakit Jantung: Scoping Review. *Borneo Nurs J*. 2025;7(2):275–84. <https://doi.org/https://doi.org/10.61878/bnj.v7i2.134>
12. Solmaz G. The Effect of Foot Massage Applied to Patients With Congestive Heart Failure on Peripheral Edema and Sleep Quality. *Holist Nurs Pract*. 2023;143–52. <https://doi.org/https://doi.org/10.1097/HNP.0000000000000581>
13. Wang W li, Hung H yuan, Chen Y ren, Chen K huei, Yang S nian, Chu C ming, et al. Effect of Foot Reflexology Intervention on Depression, Anxiety, and Sleep Quality in Adults: A Meta-Analysis and Metaregression of Randomized Controlled Trials. *Hindawi*. 2020;2020:21. <https://doi.org/https://doi.org/10.1155/2020/2654353>
14. Wahyuni S, Rusnoto, Sukesih. Pengaruh Foot Massage Terhadap Kualitas Tidur Pada Pasien Congestive Heart Failure. *J Ilmu Keperawatan dan Kebidanan*. 2025;16(1):127–33. <https://doi.org/https://doi.org/10.26751/jikk.v16i1.2683>
15. Nissa C, Wada FH, Astuti P, Batubara ST, Prima A. Studi Literatur : Pengaruh Pijat Refleksi Kaki Terhadap Gangguan Tidur Pada Lanjut Usia. 2021;7(1):8–13. <https://doi.org/https://doi.org/10.52943/jikeperawatan.v7i1.425>
16. Emilia NL, Anggreyni M, Beba NN, Sarman JNR, Sabarulin, Matongka YH. Terapi Pijat untuk Meningkatkan Kualitas Tidur pada Lansia Binaan Stikes Bala Keselamatan Palu. 2022;2(05):253–7. <https://doi.org/https://doi.org/10.53690/ipm.v2i05.168>
17. PPNI. Standar Diagnosis Keperawatan Indonesia : Definisi dan Indikator Diagnostik. Jakarta; Dewan Pengurus Pusat PPNI; 2016.
18. PPNI. Standar Luaran Keperawatan Indonesia: Definisi dan Kriteria Hasil Keperawatan. 2022.
19. Hia AN, Sianturi SR. Efektivitas Penerapan Foot Massage Terhadap Penurunan Tekanan Darah pada Lansia Hipertensi. *SURYA Med J Ilm ILMU KEPERAWATAN DAN ILMU Kesehatan Masy*. 2025;20(02):161–6. <https://doi.org/https://doi.org/10.32504/sm.v20i2.1321>
20. Hanphitakphong P, Poomsalood S, Klakankhai A, Jingleaw S, Yana B, Suangun T. A three-arm randomized controlled trial of self-foot massage and reflexology combined with aromatherapy in individuals with hypertension: Effects on physiological parameters, sleep quality, and quality of

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- life. Biomed Hum Kinet. 2026;18(1):54–64. <https://doi.org/https://doi.org/10.2478/bhk-2026-0005>
21. Lau HW, Ching SM, Fatimah A bakar. Prevalence and factors associated with poor sleep quality among patients with hypertension in a primary care clinic: A cross-sectional study. Malaysian Fam Physician. 2025;20(38):89–98. <https://doi.org/https://doi.org/10.51866/oa.830>
22. Ainun K, Kristina, Leini S. Terapi Foot Massage Untuk Menurunkan Dan Menstabilkan Tekanan Darah Pada Penderita Hipertensi. Abdimas Galuh J Pengabdian Kpd Masyarakat. 2021;3(2):328–36. <https://doi.org/http://dx.doi.org/10.25157/ag.v3i2.5902>