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Changes in Pain Intensity and Blood Pressure Following Foot Massage in Hospitalized Patients With Hypertension: A Two-Case Study

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ABSTRACT
Managing hypertension requires sustained blood pressure control while also addressing patients' pain and comfort during hospitalization. Foot massage is a complementary nursing intervention that may support relaxation and symptom management; however, its implementation alongside routine pharmacological treatment warrants careful clinical observation. We aimed to describe changes in pain intensity, blood pressure, comfort-related manifestations, and safety observations following foot massage therapy in hospitalized patients with hypertension. We conducted a descriptive two-case study in the Melati Ward of RS TK II Pelamonia Makassar, Indonesia, from June 9 to 12, 2025. Two patients received foot massage once daily for four consecutive days, with each session lasting approximately 35 minutes. Pain intensity was assessed using the Numerical Rating Scale, while blood pressure was measured before and after each session. Clinical observations and interviews documented additional comfort- and safety-related findings. Both patients demonstrated a one-point reduction in pain scores after every session. Systolic blood pressure decreased after all sessions, whereas diastolic blood pressure showed a less consistent pattern. Clinical records also captured changes in pain-related symptoms and behavioral manifestations, although comfort and fall risk were not assessed using standardized instruments. This case study describes integrating foot massage into inpatient nursing care while monitoring multiple patient outcomes. The findings suggest that foot massage may serve as a complementary, comfort-oriented intervention; however, the small sample, absence of a comparison group, and concurrent medication preclude causal conclusions. Future controlled studies should use standardized outcome measures and include longer follow-up.

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1. Introduction

Hypertension remains a major public health concern, given its association with cardiovascular, cerebrovascular, and renal complications. Persistently elevated blood pressure increases the risk of conditions such as stroke, heart failure, and chronic kidney disease, making early detection and sustained blood pressure control important components of disease prevention (World Health Organization [WHO], 2023). The global burden is substantial: the WHO estimated that approximately 1.28 billion adults aged 30–79 years were living with hypertension, and a considerable proportion were unaware of their

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condition (WHO, 2023). In Indonesia, the 2023 Indonesian Health Survey reported a hypertension prevalence of 34.1%, while measurement-based estimates in South Sulawesi indicated that hypertension affected 31.3% of the population aged 18 years and older (Kementerian Kesehatan Republik Indonesia, 2023). These figures highlight the need for accessible approaches to hypertension management, particularly interventions that can complement pharmacological treatment and address patients' experiences during care.

In addition to its cardiovascular implications, hypertension may be accompanied by symptoms that affect patients' physical comfort and perceived safety. Although many individuals with hypertension remain asymptomatic, some report headache, dizziness, and discomfort in the neck or nape, particularly when blood pressure is markedly elevated (WHO, 2023; Zainaro et al., 2021). Pain is a subjective sensory and emotional experience, and its intensity cannot be inferred from physiological measurements alone (International Association for the Study of Pain [IASP], 2020; Natalia et al., 2021). In nursing care, pain-related discomfort may coexist with restlessness, sleep disturbance, and protective behavior, potentially affecting daily functioning and the patient's sense of well-being. Clinicians should therefore assess hypertension, pain, and comfort carefully rather than assume that elevated blood pressure invariably causes pain. Previous work has also highlighted the relevance of pain management in nursing practice and the need to consider patients' reported symptoms alongside clinical observations (Winantuningtyas & Ismoyowati, 2023).

The management of hypertension generally involves antihypertensive medication and lifestyle-related measures, while nursing care may incorporate non-pharmacological interventions to support comfort and symptom management. Such interventions are relevant because patients' experiences of pain, stress, and discomfort may require attention in addition to blood pressure monitoring. Foot massage has been proposed as one complementary nursing intervention because it involves tactile stimulation and relaxation-oriented movements that may help reduce muscle tension and promote a subjective sense of comfort (Fandizal et al., 2020; Goesalosna et al., 2019). Massage is also discussed as a potential adjunct to hypertension care, with proposed effects involving relaxation and changes in peripheral circulation (Adriansyah & Huriah, 2019). Foot massage should remain an adjunct to prescribed antihypertensive treatment, not a substitute for it. Its observed effects must also be interpreted in the context of concurrent medication, the patient's clinical condition, and the timing of outcome measurements.

Although interest in foot massage is growing, several issues complicate how the existing evidence can be interpreted and applied. Studies have used different intervention schedules, session durations, and treatment contexts, making direct comparisons difficult. For example, published interventions have included sessions lasting approximately 15–30 minutes over several consecutive days, while other approaches have used shorter sessions

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or longer intervention periods (Ainun et al., 2021; Umamah et al., 2019; Widyastuti & Septiana Purbaningrum, 2022; Usniyanti et al., 2024). In addition, a reduction in blood pressure observed after massage does not, by itself, establish that massage caused the change. Antihypertensive medication, analgesics, rest, changes in pain intensity, and other aspects of inpatient care may contribute to measurements taken before and after an intervention. The timing of massage in relation to medication is therefore an important consideration when describing clinical observations, as highlighted in studies that considered the timing of foot massage in relation to antihypertensive treatment (Aditya & Khoiriyah, 2021; Niswah et al., 2022). These methodological differences make clear why intervention procedures should be described transparently and outcomes interpreted cautiously.

Previous studies have examined foot massage in relation to blood pressure and other patient outcomes. Aditya and Khoiriyah (2021) investigated foot-reflexology massage among patients with hypertension, while Umamah et al. (2019) examined manual foot-reflexology therapy and blood pressure. Widyastuti and Septiana Purbaningrum (2022) also evaluated foot-reflexology massage in patients with hypertension. Other work has described foot massage as an intervention for blood pressure management in specific clinical or community settings (Ainun et al., 2021; Fandizal et al., 2020; Nengah Aditya et al., 2024; Usniyanti et al., 2024). In addition, a case study by Niswah et al. (2022) explored foot massage for lowering blood pressure in patients with hypertension, and Hijriani et al. (2023) reported its application within a family-care context. Research has also considered foot massage in relation to pain and comfort, including a case report on acute pain (Winantuningtyas & Ismoyowati, 2023) and a review of its application among patients undergoing hemodialysis (Nabrita et al., 2024). Taken together, these studies provide a basis for examining foot massage as a complementary intervention, although their differing populations and designs limit the extent to which findings can be generalized to hospitalized patients experiencing hypertension-related discomfort.

A more specific gap concerns the description of foot massage as part of nursing care for patients with hypertension who present with pain-related disturbances in comfort and safety. Much of the literature cited in the source manuscript focuses primarily on blood pressure, whereas the patient's reported pain, behavioral manifestations, sleep-related complaints, and safety-related observations may receive less systematic attention. Existing reports also vary in intervention duration and in the extent to which they document concurrent treatment, which is important when interpreting changes in blood pressure and pain (Aditya & Khoiriyah, 2021; Niswah et al., 2022; Usniyanti et al., 2024). To address this practice-oriented gap, we conducted a descriptive two-case study involving repeated assessments before and after foot massage sessions over four consecutive days. Its contribution is not to establish efficacy or a new physiological mechanism, but to document

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the implementation of a defined foot massage protocol and describe concurrent changes in pain intensity, blood pressure, comfort-related manifestations, and safety observations in two hospitalized patients.

Accordingly, this study aimed to describe the implementation of foot massage therapy in patients with hypertension who experienced pain-related disturbances in comfort and safety. Specifically, it examined changes in pain intensity and systolic and diastolic blood pressure before and after daily foot massage sessions over four days, while also documenting relevant comfort-related symptoms and safety observations. The study was guided by the following questions: (1) How did pain intensity change before and after foot massage therapy in the two patients? (2) What changes in systolic and diastolic blood pressure were observed across the four-day intervention period? (3) What comfort-related manifestations and safety observations were documented during the implementation of foot massage therapy? These questions allow the study to provide a detailed account of a nursing intervention in a real-world inpatient setting, while recognizing that the two-case design and concurrent medical treatment do not permit causal conclusions about the effects of foot massage.

2. Methodology

Study Design

We used a descriptive two-case study design with repeated pre-intervention and post-intervention assessments to document changes in pain intensity and blood pressure following foot massage therapy in patients with hypertension. The study focused on the implementation of a non-pharmacological nursing intervention for patients experiencing pain-related disturbances in comfort and safety. Data were collected from two patients over four consecutive days. Systolic and diastolic blood pressure and pain intensity were measured before and after each intervention session. Clinical observations and interviews were also used to document patients' symptoms, behavioral responses, and comfort-related experiences. Because the sample included only two patients and there was no comparison group, we describe the changes observed in these cases rather than test the causal efficacy of foot massage.

Setting and Participants

We conducted the study in the Melati inpatient ward of RS TK II Pelamonia Makassar, South Sulawesi, Indonesia, from June 9 to 12, 2025. Following authorization from the hospital, the researchers identified 10 patients diagnosed with hypertension for eligibility screening. Two patients met the inclusion criteria and participated in the study: Mr. S, a 55-year-old man, and Mrs. K, a 51-year-old woman. The remaining patients were excluded because they were not taking antihypertensive medication (four patients), had decreased

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levels of consciousness (two patients), or had conditions that prevented foot massage, including a foot infusion and diabetic foot wounds (two patients).

Participants were eligible if they had a diagnosis of hypertension, experienced pain-related discomfort, were receiving antihypertensive medication, were conscious and able to communicate, were willing to participate for four consecutive days, and were cooperative during the intervention. Exclusion criteria comprised foot infection or open wounds, serious foot conditions such as osteoporosis, arthritis, or amputation, bilateral foot swelling, an infusion in the foot, severe diabetes accompanied by foot wounds, and reduced consciousness. These criteria were intended to ensure that participants could safely receive the intervention and provide reliable self-reported pain assessments.

Intervention: Foot Massage Therapy

Foot massage therapy was administered once daily for four consecutive days. Each session lasted approximately 35 minutes and involved massage of both feet using baby oil or essential oil. The intervention followed a structured procedure comprising 12 massage maneuvers, including warming movements, massage of the plantar arch and heel, toe flexion and stretching, fist and thumb massage, pressure applied to the dorsum of the foot, massage around the Achilles tendon, circular movements, toe massage, and a final sweeping movement. The procedures were based on the foot massage guidance cited in the source manuscript (Ainun et al., 2021; Burgess, 2023).

Before each session, the researcher explained the procedure and prepared the patient for treatment. The patient was positioned comfortably, and the feet were supported on a towel. Oil was applied to facilitate the massage. The maneuvers were performed gently, with attention to the patient's comfort and response throughout the session. The intervention was discontinued or adjusted if the patient experienced discomfort. Both feet were treated during each session, with the overall duration maintained at approximately 35 minutes.

The intervention was delivered in addition to the patients' prescribed medical treatment. Mr. S received candesartan and intravenous Santagesik, while Mrs. K received amlodipine and intravenous ketorolac. Medication schedules were considered when planning the intervention and interpreting the observations. However, because both patients received concurrent antihypertensive and analgesic treatment, the contribution of foot massage cannot be isolated from the effects of medication or other aspects of inpatient care.

Outcome Measures and Data Collection

Data were collected through patient interviews, clinical observation, and repeated measurements. The primary outcomes were pain intensity and blood pressure. Additional observations addressed symptoms and behaviors associated with comfort and safety.

Pain intensity was assessed using the Numerical Rating Scale (NRS), on which

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patients rated their pain from 0 (no pain) to 10 (worst possible pain). For descriptive interpretation, scores of 1–3 were classified as mild pain, 4–6 as moderate pain, and 7–10 as severe pain, consistent with the categories presented in the source manuscript. Patients were asked to report their pain before and after each foot massage session. The assessment also considered the location and characteristics of pain, including headache, neck or nape pain, and lower-limb pain.

Blood pressure was measured using a sphygmomanometer before and after each session. Systolic and diastolic values were recorded in millimeters of mercury (mmHg) on a structured observation sheet. The same measurement schedule was applied across the four intervention days. The observation records also included pulse rate and clinical manifestations associated with discomfort, such as restlessness, facial grimacing, protective behavior, and difficulty sleeping. Safety-related observations included documented fall risk.

Interviews were conducted to obtain demographic information, the presenting complaint, current and previous medical history, family history, medication use, and relevant lifestyle factors. Information was obtained from the patients and, where relevant, supplemented by information from family members and healthcare personnel. The researchers also observed patients' responses during and after the intervention. All measurements and observations were documented on the study's data collection forms.

Data Analysis

We analyzed the data descriptively for each patient. We checked the observation sheets for completeness and organized the measurements chronologically for each participant. Pre-intervention and post-intervention pain scores and blood pressure readings were compared for each session across the four-day period. Changes in pain intensity and blood pressure were summarized using the recorded values, while interview and observation data were used to describe changes in reported symptoms, comfort-related behaviors, and safety observations. We present the findings in tables and narrative form to compare the two cases. No inferential statistical tests were performed. Accordingly, the results were interpreted as descriptive observations and not as evidence of statistical significance or a causal treatment effect.

3. Results and Discussion

Characteristics of the Participants

This case study involved two patients with hypertension who experienced pain and disturbances in comfort. Patient 1 (Mr. S) was a 55-year-old man, whereas Patient 2 (Mrs. K) was a 51-year-old woman. Both patients received foot massage therapy once daily for four consecutive days, from June 9 to 12, 2025, in the Melati Ward of RS TK II Pelamonia Makassar. Each session lasted approximately 35 minutes. Pain intensity was assessed using the Numerical Rating Scale (NRS), while blood pressure was measured using a

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sphygmomanometer.

Changes in Pain Intensity

Pain intensity decreased after each foot massage session in both patients. As presented in Table 1, Patient 1's NRS score decreased from 5 before the first session to 4 after the session. On Day 2, the score decreased from 4 to 3; on Day 3, from 4 to 3; and on Day 4, from 3 to 2.

Patient 2 initially reported a higher pain intensity, with an NRS score of 7 before the first session. This decreased to 6 after therapy. On Days 2 and 3, the score decreased from 5 to 4 on each day. On Day 4, the score decreased from 4 to 3. Thus, both patients had lower post-session pain scores than pre-session scores throughout the four-day observation period.

Table 1. Pain intensity scores before and after foot massage therapy

Observation day	Patient 1: Pre	Patient 1: Post	Patient 2: Pre	Patient 2: Post
Day 1	5	4	7	6
Day 2	4	3	5	4
Day 3	4	3	5	4
Day 4	3	2	4	3

Note. Pre = before the foot massage session; Post = after the foot massage session. Pain intensity was assessed using the Numerical Rating Scale (NRS).

Figure 1 illustrates the changes in pain intensity before and after each session. Both patients showed a consistent one-point reduction in NRS scores following each session. The pre-session and post-session scores were also lower on Day 4 than on Day 1.

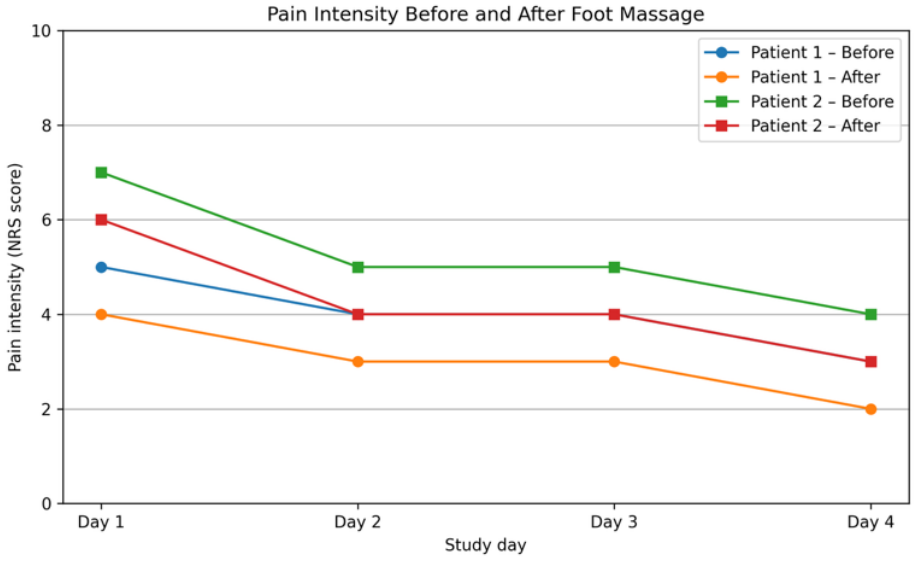


Figure 1. Pain intensity before and after foot massage therapy

Changes in Blood Pressure

Systolic blood pressure

Systolic blood pressure decreased after each foot massage session in both patients.

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As shown in Table 2, Patient 1's systolic blood pressure decreased from 150 mmHg before the first session to 140 mmHg afterward. On Days 2, 3, and 4, the corresponding pre- and post-session measurements were 140 and 130 mmHg, 130 and 125 mmHg, and 130 and 120 mmHg, respectively.

Patient 2's systolic blood pressure decreased from 190 to 180 mmHg on Day 1, from 170 to 160 mmHg on Day 2, from 160 to 150 mmHg on Day 3, and from 150 to 140 mmHg on Day 4.

Table 2. Systolic blood pressure before and after foot massage therapy

Observation day	Patient 1: Pre (mmHg)	Patient 1: Post (mmHg)	Patient 2: Pre (mmHg)	Patient 2: Post (mmHg)
Day 1	150	140	190	180
Day 2	140	130	170	160
Day 3	130	125	160	150
Day 4	130	120	150	140

Note. Pre = before the foot massage session; Post = after the foot massage session.

Figure 2 presents the systolic blood pressure measurements over the four-day intervention period. Both patients had lower post-session systolic blood pressure readings than pre-session readings at every observation. Patient 2 had higher systolic blood pressure measurements than Patient 1 throughout the observation period.

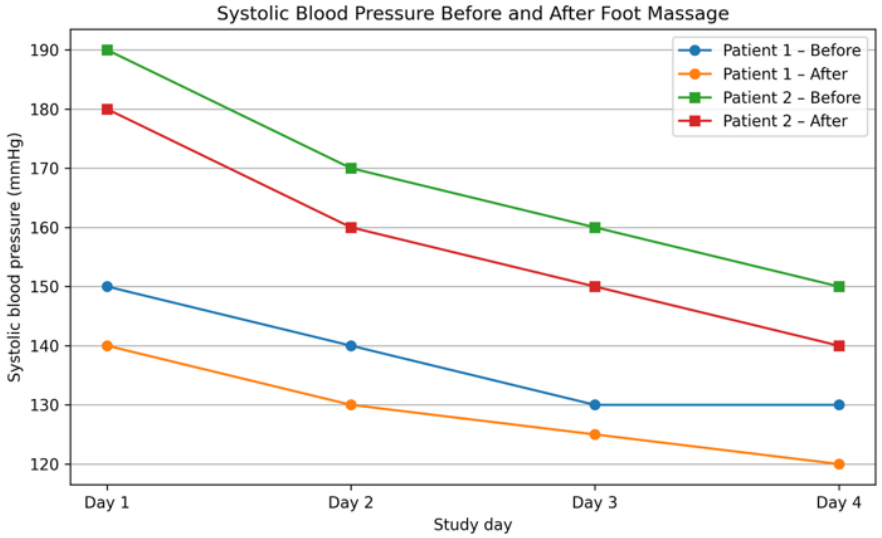


Figure 2. Systolic blood pressure before and after foot massage therapy

Diastolic blood pressure

Diastolic blood pressure decreased after most foot massage sessions. As shown in Table 3, Patient 1's diastolic blood pressure decreased from 90 to 80 mmHg on Day 1, remained at 80 mmHg before and after therapy on Day 2, and decreased from 90 to 80 mmHg on both Days 3 and 4.

For Patient 2, diastolic blood pressure decreased from 100 to 80 mmHg on Day 1 and

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from 90 to 70 mmHg on Day 2. On Day 3, it remained at 90 mmHg before and after therapy. On Day 4, it decreased from 90 to 80 mmHg.

Table 3. Diastolic blood pressure before and after foot massage therapy

Observation day	Patient 1: Pre (mmHg)	Patient 1: Post (mmHg)	Patient 2: Pre (mmHg)	Patient 2: Post (mmHg)
Day 1	90	80	100	80
Day 2	80	80	90	70
Day 3	90	80	90	90
Day 4	90	80	90	80

Note. Pre = before the foot massage session; Post = after the foot massage session.

Figure 3 shows the diastolic blood pressure measurements. In contrast to the consistent post-session decreases in systolic blood pressure, diastolic blood pressure remained unchanged in two observations: Patient 1 on Day 2 and Patient 2 on Day 3.

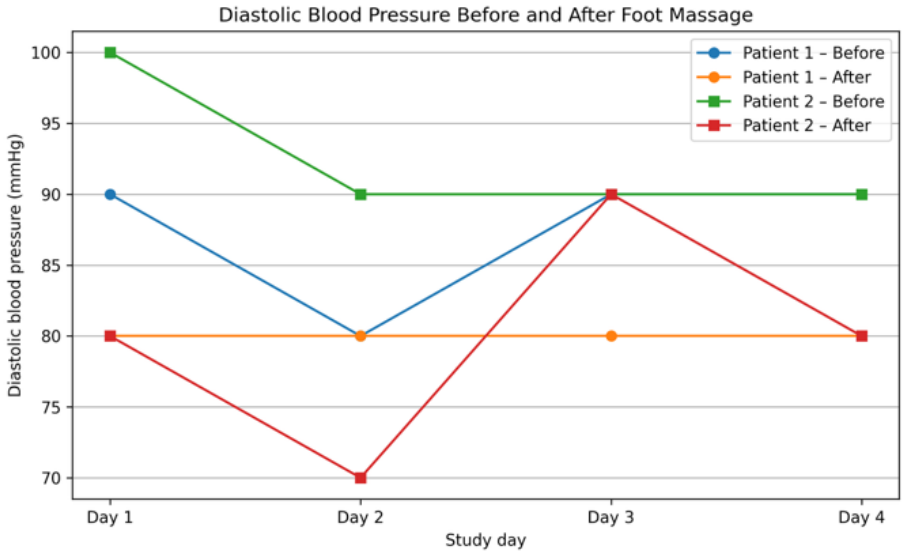


Figure 3. Diastolic blood pressure before and after foot massage therapy

Comfort-Related Clinical Observations

The clinical records documented several manifestations associated with discomfort, including headache, neck or nape pain, difficulty sleeping, restlessness, grimacing, and protective behavior. These observations were recorded during the assessments of the two patients throughout the intervention period.

Patient 2 also had pulse measurements of 106 beats per minute on Day 1 and 104 beats per minute on Day 2. These observations provide additional clinical context for the patients' reported pain and discomfort.

Table 4. Summary of documented comfort-related observations

Clinical observation	Recorded finding
Pain-related complaints	Headache and neck/nape pain
Sleep	Difficulty sleeping

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Behavioral manifestations	Restlessness, grimacing, and protective behavior
Pulse rate	Patient 2: 106 beats/minute on Day 1 and 104 beats/minute on Day 2

Note. This table summarizes the clinical observations documented in the case records. The available data do not provide a standardized numerical comfort score or a complete day-by-day frequency for each observation.

Because comfort was not measured using a standardized numerical scale in the available records, changes in comfort are described qualitatively rather than as quantified outcomes.

Safety-Related Observations

Fall risk was documented during the initial pre-session assessment for both patients on Day 1. For Patient 2, fall risk was also recorded before the session on Day 2. No further fall-risk entries were reported in the available records for the remaining assessments.

Table 5. Documented fall-risk observations

Observation	Patient 1	Patient 2
Day 1, pre-session	Fall risk documented	Fall risk documented
Day 2, pre-session	No further entry reported	Fall risk documented
Remaining assessments	No further entry reported	No further entry reported

Note. "No further entry reported" indicates that no additional fall-risk entry was available in the records. It should not be interpreted as a confirmed absence of fall risk. No actual falls were reported in the available records.

These findings describe the documentation of fall risk during the observation period. They do not establish a measured reduction in fall risk because no standardized fall-risk score or repeated formal assessment was reported.

Summary of Findings

Across the four-day observation period, both patients had lower pain scores immediately after each foot massage session than before the session. Systolic blood pressure also decreased after every session, while diastolic blood pressure decreased in most sessions and remained unchanged in two observations. The clinical records additionally documented pain-related discomfort, selected pulse measurements, and fall-risk observations.

These findings describe pre- and post-session changes in two patients receiving treatment for hypertension. Because both patients were also receiving antihypertensive medication, and the manuscript reports concurrent analgesic treatment, the observed changes cannot be attributed to foot massage therapy alone. The results are descriptive and do not establish a causal effect or statistical significance.

Discussion

This case study examined the use of foot massage therapy as a complementary nursing intervention for two hospitalized patients with hypertension who experienced pain-related disturbances in comfort and safety. Across four consecutive days, both patients demonstrated lower pain scores immediately after each session, accompanied by reductions in systolic blood pressure. Diastolic blood pressure also decreased after several sessions,

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although the pattern was less consistent. These observations suggest that foot massage may support short-term comfort during inpatient hypertension care. However, the findings should be interpreted as descriptive changes observed during a multicomponent care process rather than evidence that foot massage independently caused the improvements. Both patients received prescribed antihypertensive and analgesic medication, and the study had no control group or design capable of separating the effects of massage from medication, rest, and other aspects of hospital care.

The most consistent finding was the one-point reduction in pain intensity following every foot massage session. Patient 1's Numerical Rating Scale (NRS) score declined from 5 before the first session to 2 after the fourth session, while Patient 2's score decreased from 7 to 3. These changes indicate that both patients reported less pain at the end of each session, with the overall pattern moving from moderate to mild pain for Patient 1 and from severe to mild pain for Patient 2. The repeated, immediate reductions are clinically relevant as observations of patients' reported experience, particularly because pain was one of the principal concerns motivating the intervention. Nevertheless, the magnitude of change should not be overstated: each session was followed by a one-point reduction, and the study did not include a comparison condition to establish whether a similar change would have occurred with rest or routine care alone. The findings are consistent with the application of foot massage as a supportive measure for pain management described by Winantuningtyas and Ismoyowati (2023). They also align with the broader emphasis on assessing pain as a subjective sensory and emotional experience, for which the patient's own report remains central (International Association for the Study of Pain [IASP], 2020; Natalia et al., 2021).

The gradual decline in pre-session pain scores across the four days adds a second dimension to this finding. Patient 1's pre-session score decreased from 5 on Day 1 to 3 on Day 4, while Patient 2's score declined from 7 to 4. This pattern suggests that the patients' reported pain was lower at the beginning of the later sessions than at the beginning of the first session. It may reflect an accumulating benefit from repeated relaxation-oriented care, but other explanations remain plausible. The patients were receiving inpatient treatment, including analgesics, and their underlying clinical conditions may also have changed over time. Moreover, pain was reported to fluctuate with time of day and sleep disruption. These factors make it difficult to attribute the longitudinal decline to massage alone. These findings reinforce the value of assessing pain before and after each intervention, but they do not establish the duration or cumulative effect of foot massage.

The reduction in pain is also relevant to the broader nursing concept of comfort. In the source manuscript, both patients initially reported headache and pain around the neck or nape, while Patient 2 additionally reported pain in the left leg and difficulty moving it. The observation records documented manifestations such as restlessness, facial grimacing, and sleep difficulty, with an elevated pulse recorded for Patient 2 on the first two days. These

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symptoms indicate that the patients' concerns extended beyond a numerical pain score to their physical and emotional experience during hospitalization. The records suggest that several discomfort-related manifestations were less evident after sessions and over the course of the observation period. This is compatible with the nursing perspective that pain assessment should consider self-reported intensity alongside behavioral and functional indicators (IASP, 2020; Natalia et al., 2021). However, the study did not use a validated multidimensional comfort instrument, and the observation table does not establish that every symptom improved consistently. Consequently, the evidence supports a descriptive account of changing comfort-related observations, not a quantified improvement in overall comfort or quality of life.

Blood pressure findings provide a related but distinct perspective. Systolic pressure decreased after every session in both patients. Patient 1's systolic pressure fell from 150 to 140 mmHg on Day 1 and from 130 to 120 mmHg on Day 4. Patient 2's systolic pressure decreased from 190 to 180 mmHg on Day 1 and from 150 to 140 mmHg on Day 4. The lower pre-session systolic measurements on later days indicate that the decline was not limited to the immediate post-session readings. These observations are broadly consistent with previous studies investigating foot massage or foot-reflexology approaches among patients with hypertension, including Aditya and Khoiriyah (2021), Umamah et al. (2019), Widyastuti and Septiana Purbaningrum (2022), and Nengah Aditya et al. (2024). Similar applications have been described in community and family-care settings (Fandizal et al., 2020; Hijriani et al., 2023; Usniyanti et al., 2024). The present study adds observations from an inpatient context in which pain and comfort were assessed alongside blood pressure.

The diastolic results, however, were more variable and caution against treating the response as uniformly consistent. Patient 1's diastolic pressure decreased from 90 to 80 mmHg on Day 1, remained at 80 mmHg before and after the Day 2 session, and decreased from 90 to 80 mmHg on Days 3 and 4. Patient 2's diastolic pressure declined from 100 to 80 mmHg on Day 1 and from 90 to 70 mmHg on Day 2, but remained at 90 mmHg before and after the Day 3 session; on Day 4, it decreased from 90 to 80 mmHg. Thus, the observed changes were not identical across patients or sessions. This variation is important because it demonstrates that systolic and diastolic measurements did not follow precisely the same pattern. It also highlights the need to report both components of blood pressure rather than summarizing the intervention as producing a general or uniform reduction.

Relaxation provides a plausible interpretation for why massage may coincide with changes in pain and blood pressure. The literature cited in the manuscript proposes that massage may reduce muscle tension and promote relaxation, while reflexology studies have discussed possible links with autonomic activity and circulation (Adriansyah & Huriah, 2019; Puspita, 2024). The patients' reports of feeling more relaxed and physically comfortable are compatible with a relaxation-related response. Nevertheless, this study did

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not measure autonomic activity, vascular function, endorphin release, or any other physiological mechanism. Claims that specific reflex points directly influence the heart, induce vasodilation, or produce a particular neurochemical response therefore cannot be established from these data. The findings are better understood as observed clinical changes that are compatible with, but do not verify, proposed explanations in the literature.

Concurrent pharmacological treatment is particularly important when interpreting the blood pressure and pain findings. Patient 1 received candesartan and intravenous Santagesik, while Patient 2 received amlodipine and intravenous ketorolac. The manuscript indicates that massage was scheduled in relation to medication timing; however, its description of whether the intervention occurred before or after medication is inconsistent. The limitations section states that massage was performed after antihypertensive and analgesic treatment. This inconsistency should be resolved in the final manuscript because medication timing affects the interpretation of pre- and post-session measurements. The study itself acknowledges that the effects of medication may have contributed to the observed changes. Accordingly, the results cannot establish that massage was effective independently of pharmacological treatment. This is also a methodological consideration when comparing the present observations with previous studies that used different schedules, durations, or approaches to medication timing (Aditya & Khoiriyah, 2021; Niswah et al., 2022; Usniyanti et al., 2024).

The safety observations also warrant caution. Both patients were recorded as having a risk of falling before the first session, and Patient 2 was again recorded as having a fall risk before the second session. No fall-risk entry was recorded after the relevant sessions or on subsequent days. This pattern may indicate that the patients' immediate clinical presentation changed during the observation period, but it does not establish that foot massage reduced fall risk. The study did not report the use of a validated fall-risk assessment tool, and the absence of a recorded risk indicator is not equivalent to a confirmed reduction in risk. Headache, dizziness, mobility limitations, and the need for assistance should continue to be assessed directly as part of routine nursing care. The value of the present observations is therefore that they draw attention to safety as an aspect of comfort-focused care, rather than demonstrating a preventive effect of massage on falls.

The study's main contribution is its integrated description of pain, blood pressure, comfort-related manifestations, and safety observations during a defined four-day foot massage protocol. Much of the cited literature emphasizes blood pressure outcomes, whereas the present cases illustrate how the intervention was incorporated into care for patients whose concerns included pain, sleep disturbance, restlessness, and perceived safety. This broader focus is consistent with a holistic nursing approach, in which physiological measurements are considered alongside patients' subjective experiences. At the same time, the small number of cases, the absence of a comparison group, concurrent

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medication, and incomplete standardization of some measurement conditions limit generalizability. The study also did not establish whether the observed changes persisted beyond each session or after discharge. Future studies could use larger samples, a comparison group, standardized timing relative to medication, clearly specified blood pressure measurement procedures, and validated measures of pain, comfort, and fall risk. Longer follow-up would help determine whether the observed changes are sustained.

In conclusion, the two cases showed lower post-session pain scores and systolic blood pressure after foot massage, alongside changes in some comfort-related symptoms and safety observations. The findings support considering foot massage as a complementary comfort-oriented nursing intervention, provided it is used alongside prescribed medical treatment and appropriate clinical monitoring. They do not establish independent efficacy, a specific physiological mechanism, or a reduction in fall risk. The practical contribution of the study lies in documenting how a structured foot massage intervention was implemented and assessed in hospitalized patients with hypertension and pain, while identifying the methodological issues that future research should address.

4. Conclusion

This two-patient case study described the implementation of foot massage therapy as a complementary nursing intervention for hospitalized patients with hypertension and pain-related disturbances in comfort and safety. Across four consecutive days, both patients experienced a one-point reduction in Numerical Rating Scale (NRS) pain scores immediately after each approximately 35-minute session. Systolic blood pressure also decreased after every session, while diastolic blood pressure showed a less consistent pattern. The clinical records further documented pain-related complaints, behavioral manifestations of discomfort, and fall-risk observations during the intervention period. Taken together, these findings indicate that foot massage was accompanied by short-term improvements in reported pain and changes in blood pressure measurements in both cases. However, the qualitative comfort observations and safety records do not establish a measurable reduction in overall discomfort or fall risk. The findings should therefore be interpreted as descriptive clinical observations rather than evidence of a causal or independent therapeutic effect.

The study is limited by its two-patient sample, the absence of a comparison group, and the concurrent administration of antihypertensive and analgesic medications, which prevents the observed changes from being attributed to foot massage alone. In addition, comfort was not assessed using a standardized instrument, fall risk was not quantified using a validated assessment tool, and the available observations do not establish whether the changes persisted beyond the intervention period. Future studies should include larger samples and appropriate comparison groups, standardize the timing of massage and outcome measurements in relation to medication, and use validated measures of pain,

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comfort, and fall risk. Longer follow-up would also help clarify the duration of any observed changes. Despite these limitations, this case study contributes a practical account of incorporating foot massage into inpatient nursing care while monitoring pain, blood pressure, comfort-related manifestations, and safety. Foot massage may be considered as a complementary, comfort-oriented intervention within individualized nursing care, provided that it does not replace prescribed antihypertensive or analgesic treatment and that patients continue to receive appropriate clinical monitoring.

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