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Research article

Combined Warm Foot Soaks and Massage Rollers to Reduce Blood Pressure in Elderly Hypertensive Patients

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Abstract

Hypertension is a common health problem in adults and can lead to serious complications if not properly managed. At UPTD PSLU Tresna Werdha Natar, cases have increased over the past three years. Current management relies mainly on pharmacological therapy, while non-pharmacological interventions, such as warm foot soaks and foot massage rollers, have not been implemented. This study aimed to determine the effect of combining warm foot soaking and foot massage rollers on blood pressure in hypertensive patients at UPTD PSLU Tresna Werdha Natar, South Lampung, in 2025. This study used a quantitative pre-experimental design with a one-group pre-test-post-test approach. A total of 17 respondents were selected using purposive sampling. The intervention consisted of warm foot soaks combined with a foot-massage roller, administered three times per week for 2 weeks. Data were analyzed using the paired-samples t-test. Most respondents were female (64.7%) and aged 60–70 years (58.8%). Before the intervention, the majority of respondents had Stage 2 hypertension (76.5%). After the intervention, the mean systolic blood pressure decreased from 146.29 mmHg to 137.06 mmHg, while the mean diastolic blood pressure decreased from 94.94 mmHg to 85.41 mmHg. The paired-samples t-test showed $p < 0.001$, indicating a significant effect of the combined intervention on blood pressure. These findings suggest that combining warm foot soaks with foot massage rollers can be used as a non-pharmacological intervention to help control blood pressure in elderly patients with hypertension.

Keywords: *Hypertension, Warm Foot Soak, Foot Massage Roller, Blood Pressure, Elderly*

Abstrak

Hipertensi merupakan masalah kesehatan umum pada orang dewasa dan dapat menyebabkan komplikasi serius jika tidak ditangani dengan benar. Di UPTD PSLU

Tresna Werdha Natar, kasus hipertensi meningkat selama tiga tahun terakhir. Penanganan saat ini sebagian besar bergantung pada terapi farmakologis, sementara intervensi nonfarmakologis seperti rendaman kaki hangat dan pijat kaki menggunakan *roller* belum diterapkan. Penelitian ini bertujuan untuk mengetahui pengaruh kombinasi rendaman kaki hangat dan pijat kaki menggunakan *roller* terhadap tekanan darah pada pasien hipertensi di UPTD PSLU Tresna Werdha Natar, Lampung Selatan, pada tahun 2025. Penelitian ini menggunakan desain pra-eksperimental kuantitatif dengan pendekatan *pre-test-post-test* satu kelompok. Sebanyak 17 responden dipilih menggunakan *purposive sampling*. Intervensi terdiri dari rendaman kaki hangat yang dikombinasikan dengan pijat kaki menggunakan *roller*, diberikan tiga kali seminggu selama dua minggu. Data dianalisis menggunakan uji t sampel berpasangan. Sebagian besar responden adalah perempuan (64,7%) dan berusia 60–70 tahun (58,8%). Sebelum intervensi, mayoritas responden memiliki hipertensi stadium 2 (76,5%). Setelah intervensi, tekanan darah sistolik rata-rata menurun dari 146,29 mmHg menjadi 137,06 mmHg, sedangkan tekanan darah diastolik rata-rata menurun dari 94,94 mmHg menjadi 85,41 mmHg. Uji t sampel berpasangan menunjukkan nilai $p < 0,001$, yang mengindikasikan efek signifikan dari intervensi gabungan dalam menurunkan tekanan darah. Temuan ini menunjukkan bahwa kombinasi rendaman kaki hangat dan pijat kaki dengan *roller* dapat diterapkan sebagai intervensi non-farmakologis untuk membantu mengontrol tekanan darah pada pasien lanjut usia dengan hipertensi.

Kata kunci: hipertensi, rendaman kaki hangat, pijat kaki menggunakan *roller*, tekanan darah, lanjut usia

INTRODUCTION

Hypertension, also known as high blood pressure, is a non-communicable disease that remains a major health challenge, both globally and nationally. This condition is often referred to as a silent killer because it generally does not show obvious symptoms, but it can lead to various serious complications such as stroke, coronary heart disease, chronic kidney failure, and disorders of the blood vessel system (Iatridi et al., 2022; WHO, 2023). Increased blood pressure is influenced by various factors, including genetic predisposition, sedentary lifestyle, excess weight, excessive salt intake, aging, and psychological stress (Goorani et al., 2025).

According to the World Health Organization (WHO), an estimated 1.4 billion adults aged 30–79 years worldwide were living with hypertension in 2024, representing approximately 33% of the population in that age group. Approximately 600 million people (44%) were unaware of their condition. Furthermore, two-thirds of individuals with hypertension in this age range lived in low- and middle-income countries.

Hypertension remains one of the leading causes of premature death globally (WHO, 2025). In Indonesia, according to the 2023 Indonesian Health Survey (SKI), the prevalence of physician-diagnosed hypertension was 7.9%, while the prevalence based on blood pressure measurements reached 29.7% (Kemenkes RI, 2023). Meanwhile, data from the 2018 Basic Health Research (Riskesdas) showed that the prevalence of hypertension based on measurements among individuals aged ≥18 years in Indonesia was 34.11% (Riskesdas, 2018). Regional data reported by Iskandar et al. (2025) also showed a substantial increase in hypertension cases in the province, from 16,354 cases in 2022 to 41,647 cases in 2024, with the majority occurring among the elderly.

Hypertension is a common health problem among adults and has the potential to lead to various serious complications such as cerebrovascular disorders such as ischemic stroke, cerebral hemorrhage, and transient ischemic attack (TIA); heart disease such as myocardial infarction, angina pectoris, and congestive heart failure; and kidney disorders such as diabetic nephropathy or kidney failure accompanied by elevated serum creatinine levels (WHO, 2023). Hypertension management can generally be divided into two main approaches: pharmacological and non-pharmacological interventions (Timsina et al., 2023). Pharmacological interventions include the administration of antihypertensive agents, including diuretics, angiotensin-converting enzyme (ACE) inhibitors, angiotensin receptor blockers (ARBs), calcium channel blockers (CCBs), and beta-adrenergic antagonists (or beta blockers), with the aim of controlling and lowering blood pressure levels based on the patient's individual clinical profile (Salshabilla, 2024). Meanwhile, non-pharmacological approaches include adopting a healthy lifestyle and implementing complementary therapies, such as herbal remedies, meditation, aromatherapy, distraction methods, relaxation techniques (foot massage), and hydrotherapy (Oktalina et al., 2021).

One of the therapies widely used is warm-water immersion, also called a warm foot soak. Warm foot soak therapy involves immersing the feet in warm water up to 10–15 cm above the ankles (Widyaswara et al., 2022). Scientifically, this process can improve microcirculation and promote vasodilation (Aris et al., 2025). Soaking feet in warm water creates heat energy that dilates blood vessels and improves circulation,

while also stimulating nerves in the feet to activate the parasympathetic nervous system, which, in turn, influences blood pressure. Warm water hydrotherapy increases blood flow to the skin by dilating blood vessels and increasing the supply of oxygen and nutrients to tissues (Sari & Aisah, 2022).

In addition, foot massage is a safe and easy complementary therapy method for treating hypertension. This therapy involves general manipulation of the soft tissue throughout the foot, without focusing on specific reflex points associated with other organs (Erfiana et al., 2024). The resulting muscle relaxation triggers blood vessel dilation, ultimately helping gradually and steadily reduce blood pressure. Foot massage is highly effective in lowering blood pressure in the elderly and is recommended as a non-drug nursing intervention that can be performed routinely (Hia & Sianturi, 2025). One commonly used tool to support this therapy is the foot massage roller, a cylindrical device with a textured surface that is rolled under the soles of the feet for self-massage. The foot roller is commonly used as a self-massage tool to help improve blood circulation, reduce muscle tension, and promote relaxation in the feet when applied using gentle pressure and appropriate technique (Kasli et al., 2022; Su & Li, 2026).

Research by Serly et al. (2023) on foot massage therapy showed reductions of 18 mmHg in systolic blood pressure and 10 mmHg in diastolic blood pressure. The results of research conducted by Astuty & Setyawati (2024) indicated a significant decrease in blood pressure in all three participants: participant 1's blood pressure dropped from 141/103 mmHg to 121/86 mmHg, participant 2's blood pressure dropped from 140/111 mmHg to 130/88 mmHg, and participant 3's blood pressure dropped from 151/93 mmHg to 120/74 mmHg. This suggests that foot massage can be effective in helping reduce blood pressure in older adults with hypertension.

Also, a study by Widyaswara et al. (2022) indicates that soaking feet in warm water can reduce blood pressure and increase comfort, thereby improving sleep quality. Another finding by Aris et al. (2025) showed that soaking feet in warm water can lower blood pressure. The average blood pressure of study subject 1 before the intervention was 157/88 mmHg, while after the intervention, it decreased to 144/81 mmHg; thus, subject 1 experienced a decrease in systolic blood pressure of 13 mmHg and diastolic pressure of 7 mmHg. On the other hand, study subject 2 had an initial

blood pressure of 153/89 mmHg and, after treatment, 145/83 mmHg, indicating a decrease in systolic blood pressure of 8 mmHg and diastolic blood pressure of 6 mmHg.

Based on the results of the initial pre-survey conducted at UPTD PSLU Tresna Werdha Natar on October 7, 2025, after obtaining official permission from the Faculty of Health, Mitra Indonesia University, and approval from the institution, it was found that among 10 elderly respondents with hypertension, most experienced symptoms such as headaches, especially in the neck area, leg pain, dizziness, and blurred vision. To manage these complaints, respondents generally relied on medications provided by the shelter, including Amlodipine, Captopril, and Vitamin B-complex, while some occasionally used warm water foot soaks. Interviews with health workers also revealed that hypertension management in the shelter was still primarily focused on pharmacological treatment and weekly elderly exercise programs. These findings indicate that non-pharmacological interventions for hypertension management have not been optimally utilized in the nursing home setting.

Numerous studies have examined the effects of foot massage and warm foot soaks. However, there is very limited research combining the two interventions to manage blood pressure. Therefore, this study aims to determine the effect of the combination of warm water foot soaks and foot massage rollers on blood pressure in hypertension patients at the UPTD PSLU Tresna Werdha Natar, South Lampung in 2025.

RESEARCH METHOD

This study employed a pre-experimental design with a one-group pre-test–post-test approach to evaluate the effect of combined warm foot soaking and foot massage roller on blood pressure in elderly residents with hypertension. The study was conducted at UPTD PSLU Tresna Werdha Natar, South Lampung, Indonesia, over a two-week period (19–30 January 2026). The study population comprised all 25 elderly residents with confirmed hypertension residing at the institution. Using purposive sampling, an initial target of 15 participants was adjusted to 17 to account for an anticipated 10% dropout rate [n' = n / (1 − f)]. Inclusion criteria required participants to: (1) have Stage 1 hypertension (130–139/80–89 mmHg) or Stage 2 hypertension

(≥140/≥90 mmHg); (2) reside at the institution throughout the study period; (3) be communicative and cooperative; (4) be on a uniform antihypertensive regimen (identical drug, dose, and schedule); (5) elderly individuals with hypertension, including those with a history of comorbidity with diabetes mellitus (DM), provided that the DM patients do not have complications or neuropathy disorders in the feet; (6) be physically capable of undergoing the intervention; and (7) provide written informed consent. Exclusion criteria encompassed stroke, chronic kidney disease, cardiac failure, diabetic foot ulcers, open wounds, active foot infections, severe peripheral sensory loss, or unwillingness to complete the full intervention protocol.

This study was conducted under official permission from the Faculty of Health, Mitra Indonesia University, and complied with research ethics standards. Blood pressure was measured with a Taff Omicron digital sphygmomanometer, with respondents seated in a relaxed position to ensure consistent measurements. Pre-test measurements were conducted before the intervention, while post-test measurements were performed after all intervention sessions were completed using the same procedures and instruments. To minimize confounding factors, respondents continued taking the same antihypertensive medication at the same dose and schedule throughout the study. The intervention consisted of warm water foot soaking at 38–40°C for 15–20 minutes, followed by foot-massage roller therapy for 5–10 minutes, administered three times per week for 2 weeks (6 sessions total). All procedures followed a standardized SOP, and participant comfort was continuously monitored during the intervention.

Data were processed through editing, coding, entry, cleaning, and tabulation, while participant characteristics were analyzed descriptively using frequencies and percentages. Normality testing with the Shapiro-Wilk test showed that systolic pre-test, diastolic pre-test, and systolic post-test data were normally distributed, whereas diastolic post-test data remained non-normal even after log transformation. Although the diastolic post-test data were non-normal, the paired difference scores showed no extreme outliers; therefore, the paired-samples t-test was retained for consistency in analysis and interpretation. This decision was supported by the higher statistical power

of parametric tests for small sample sizes and the robustness of the paired-samples t-test against minor violations of normality assumptions (Mustapha et al., 2024).

Table 1. Normality test results

Variable	p-value	Distribution
Systolic BP – pre-test	0.703	Normal
Diastolic BP – pre-test	0.314	Normal
Systolic BP – post-test	0.666	Normal
Diastolic BP – post-test	0.003	Non-normal*

Ethical considerations were integrated into the research method.

The study was conducted in accordance with the four core principles of health research ethics, beneficence, non-maleficence, autonomy, and justice, as outlined by Utami et al. (2025). Prior to enrollment, all participants received a comprehensive explanation of study objectives, procedures, and their right to withdraw at any time without penalty. Written informed consent was obtained from each participant. Confidentiality was maintained by using anonymized, coded identifiers throughout data collection and analysis.

RESULTS

This study aimed to determine the effect of a combination of warm water foot soaks and foot massage rollers on blood pressure in elderly people with hypertension at the UPTD PSLU Tresna Werdha Natar, South Lampung, conducted on January 19–30, 2026, involving 17 respondents. The results of the study are presented in two stages of analysis: univariate analysis, which describes the characteristics of respondents and the distribution of blood pressure before and after the intervention; and bivariate analysis, which examines the effect of the intervention on changes in systolic and diastolic blood pressure using a paired t-test.

Table 2. Respondent Characteristics

Characteristics	Category	Frequency (n)	Percentage (%)
Gender	Male	6	35.3
	Female	11	64.7
	Total	17	100.0
Age (years)	60–70	10	58.8
	71–80	4	23.5
	81–90	3	17.6
	Total	17	100.0

Based on Table 2, most respondents were female (11, 64.7%), while 6 were male (35.3%). In the age category, most respondents were in the 60–70 year age group (10 respondents, 58.8%), followed by the 71–80 year age group (4 respondents, 23.5%) and the 81–90 year age group (3 respondents, 17.6%).

Table 3. Univariate Analysis Results of Pre-test and Post-test Blood Pressure Measurements

Measurement	Mean ± SD	Median (Min–Max)
Pre-test Systolic	146.29 ± 9.061	147 (132–165)
Pre-test Diastolic	94.94 ± 8.340	96 (81–107)
Post-test Systolic	137.06 ± 3.325	137 (132–145)
Post-test Diastolic	85.41 ± 5.026	85 (80–98)

Table 3 presents the comparison of systolic and diastolic blood pressure measurements before (pre-test) and after (post-test) the intervention. Before the intervention, the mean systolic blood pressure was 146.29 ± 9.061 mmHg, with a median of 147 mmHg and a range of 132–165 mmHg. The mean diastolic blood pressure was 94.94 ± 8.340 mmHg, with a median of 96 mmHg and a range of 81–107 mmHg. These values indicate that most respondents were in the hypertensive category prior to the intervention. After the intervention, blood pressure decreased significantly. The mean systolic blood pressure decreased to 137.06 ± 3.325 mmHg, with a median

of 137 mmHg and a range of 132–145 mmHg. Similarly, the mean diastolic blood pressure decreased to 85.41 ± 5.026 mmHg, with a median of 85 mmHg and a range of 80–98 mmHg.

Table 4. Bivariate Analysis of Blood Pressure Changes After Combined Intervention

Variable	Mean Difference	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
Systolic BP	9.23529	8.43749	2.04639	4.513	16	$p < 0.001$
Diastolic BP	10.05882	8.48138	2.05704	4.890	16	$p < 0.001$

Based on the paired-samples t-test results, there was a significant decrease in respondents' blood pressure after the intervention. The average systolic blood pressure decreased by 9.235 mmHg, while the mean diastolic blood pressure decreased by 10.059 mmHg. The statistical test showed $p < 0.001$ for both systolic and diastolic blood pressure, indicating that the intervention was associated with a meaningful reduction in blood pressure. These findings suggest that the intervention may help reduce the cardiovascular burden experienced by respondents. However, because this study used a one-group pre-test-post-test design without a control group, other factors outside the intervention may also have influenced the results, such as daily blood pressure fluctuations, placebo effects, or respondents' medication adherence. Even so, the consistent reduction in both systolic and diastolic blood pressure indicates that the intervention has promising potential as a supportive therapeutic approach.

Table 5. Distribution of Hypertension Categories Before and After the Combination Intervention of Warm Water Foot Soak and Foot Massage Roller

Hypertension Category	Pre-test n (%)	Post-test n (%)
Stage 1 Hypertension	4 (23.5%)	14 (82.4%)
Stage 2 Hypertension	13 (76.5%)	3 (17.6%)
Total	**17 (100%)**	**17 (100%)**

The results showed that before receiving the combined intervention of warm water foot soaking and a foot-massage roller (pre-test), most respondents (13, 76.5%) were classified as having Stage 2 hypertension, while the remaining 4 (23.5%) were categorized as having Stage 1 hypertension. After the intervention was administered (post-test), there was a noticeable change in the distribution of hypertension categories. The majority of respondents shifted to Stage 1 hypertension, increasing to 14 respondents (82.4%), while only 3 respondents (17.6%) remained in the Stage 2 hypertension category. These findings indicate that the intervention reduced respondents' blood pressure levels.

DISCUSSION

Respondent characteristics show that the majority of respondents were female (11 people) (64.7%), while 6 were male (35.3%). In terms of age, the majority were in the 60–70 year range, namely 10 respondents (58.8%), followed by 71–80 year olds (4 respondents) (23.5%), and 81–90 year olds (3 respondents) (17.6%). Hypertension tends to increase with age in both sexes, but women have a higher risk after entering menopause due to a decrease in the hormone estrogen, which plays a role in cardiovascular protection (Paresh et al., 2019). This finding aligns with the study by Amalia & Sjarqiah (2023), which found that elderly women are more susceptible to hypertension, and with the research by Akbar et al. (2020), which showed that the majority of respondents with hypertension are women. The decrease in estrogen after menopause causes blood vessels to become stiffer and less elastic, thereby increasing blood pressure (Iswandari & Hasanah, 2023). Furthermore, factors such as early menopause, the use of hormonal contraceptives, and weight gain contribute to worsening the condition.

Physiologically, aging can cause changes in the heart, blood vessels, and hormones, leading to increased blood pressure. With age, blood vessel elasticity decreases, reducing the heart's ability to pump blood (Nora et al., 2023). This is supported by Hall & Hall (2020) and Amalia & Sjarqiah (2023), who state that blood pressure increases from adulthood to old age due to thickening of blood vessel walls and decreased elasticity. According to Syarif et al. (2025), approximately 50–60% of

individuals aged 60 years or older have blood pressure ≥140/90 mmHg due to degenerative processes. These findings align with research by Rahayu et al. (2020) and Prabasari et al. (2024), which indicates an increased risk of hypertension with age, and by Akbar et al. (2020), which states that the majority of respondents were elderly. Based on the researchers' assumptions, the predominance of female respondents aged 60–70 years at the UPTD PSLU Tresna Werdha Natar, South Lampung, indicates that age, menopause, uncontrolled diet, lack of physical activity, obesity, and comorbidities such as diabetes mellitus contribute to increased blood pressure.

Based on pre-test results from 17 respondents, the majority (13 people) were in Stage 2 hypertension (76.5%), while 4 people (23.5%) were in Stage 1 hypertension. This indicates that before the intervention, the majority of respondents had Stage 2 hypertension. Hypertension is a chronic condition characterized by increased blood pressure in the arteries, forcing the heart to work harder to pump blood throughout the body. This condition can cause blood vessel damage and lead to degenerative and even life-threatening diseases (Octavianie et al., 2022).

Non-pharmacological therapies such as warm foot soaks and foot rolling have mechanisms that can help lower blood pressure. According to Putri Ardina & Kurniawan (2024), warm foot soaks can relax blood vessels, improve microcirculation, stimulate the parasympathetic nervous system, and increase the flow of oxygen and nutrients to tissues through vasodilation. Meanwhile, foot rolling, a self-myofascial release technique, can increase blood flow, reduce swelling, relieve fatigue, and provide a relaxing effect through nerve stimulation in the soles of the feet (Sundstrom, 2025).

Various studies support the effectiveness of both therapies. Research by Alvaredo et al. (2025) showed that a combination of warm foot soaks and massage can reduce hypertension by 80% and increase comfort. Another study by Oktavianti & Insani (2022) showed a significant effect ($p = 0.005$). A case study by Erfiana et al. (2024) reported a decrease in blood pressure in two respondents, and research by Yasinta et al. (2016) also found a significant difference in blood pressure before and after the intervention ($p < 0.001$). Furthermore, Aditya & Khoiriyah (2021) reported a decrease in blood pressure among three respondents following foot reflexology therapy. Based on these results, this may be related to the fact that the majority of

respondents were aged 60–70 years with Stage 2 hypertension, where age factors, the aging process, and menopause in women cause blood vessels to become stiff and less elastic, thereby increasing blood pressure.

After the intervention, the majority of respondents (14 people) were in Stage 1 hypertension, while 3 respondents (17.6%) were still in Stage 2 hypertension. These results indicate a decrease in hypertension levels following the combined interventions. Massage therapy is known to be effective in lowering blood pressure because it relaxes tense muscles, triggering vasodilation and consistently lowering blood pressure (Ainun et al., 2021; Ardiansyah & Huriah, 2019). Reflexology also has various benefits, such as relieving pain, boosting the immune system, reducing stress, and helping manage chronic diseases (Khamid & Z, 2025).

Furthermore, warm foot soak therapy physiologically stimulates baroreceptors and activates the parasympathetic nervous system, thereby reducing cardiac contractility and blood pressure. The heating effect of warm water causes vasodilation, increases tissue perfusion, and helps stabilize blood pressure (Saputra et al., 2023). This is supported by research conducted by Putri et al. (2023), which showed a decrease in blood pressure after warm foot-soak therapy, and by another study by Hartutik & Suratih (2017), which showed a decrease from hypertension to pre-hypertension. Dewi et al. (2023) also state that this therapy is effective in lowering blood pressure, while Sihotang (2021) shows that foot reflexology can significantly lower blood pressure, with p-values of 0.000 (systolic) and 0.037 (diastolic).

Although elevated blood pressure in the elderly is part of the aging process, this condition must still be controlled according to guidelines, which recommend a systolic blood pressure below 140 mmHg to prevent serious complications. The decrease in blood pressure after the intervention is temporary due to activation of the parasympathetic nervous system and peripheral vasodilation, but this therapy may be useful as a complementary therapy if performed continuously (WHO, 2021). A possible explanation for respondents who remained in Stage 2 hypertension is the influence of age and limited physical activity, which may cause blood vessels to become stiff so that blood pressure remains high.

The paired-samples test results in Table 4 showed a significant decrease in both systolic and diastolic blood pressure after the intervention. Systolic blood pressure showed a mean difference of 9.235 mmHg ($t = 4.513$; $df = 16$; $p < 0.001$), while diastolic blood pressure showed a mean difference of 10.059 mmHg ($t = 4.890$; $df = 16$; $p < 0.001$). Physiologically, foot massage can stimulate the release of hormones such as endorphins, serotonin, histamine, and bradykinin, which trigger vasodilation and muscle relaxation, thus lowering blood pressure (Calisanie & Preannisa, 2022; Herdiana et al., 2019). Meanwhile, warm-water foot-soak therapy at 39-40°C increases relaxation by dilating blood vessels and reducing muscle tension (Sudarta et al., 2024). The results of this study align with those of Lestari et al. (2023), which demonstrated a reduction in blood pressure after warm foot-soak therapy, and Azyyati et al. (2023), which found a difference in the effectiveness of warm foot-soak therapy on diastolic blood pressure. Research by Astuty & Setyawati (2024) demonstrated a significant reduction in blood pressure after foot massage, while Nugroho et al. (2023) demonstrated a reduction in blood pressure after warm foot-soak therapy.

A comparison of the pre- and post-intervention results showed significant changes, suggesting that the combination of warm foot soaks and foot roller massage was associated with reduced blood pressure in elderly hypertensive patients. This intervention is also safe, easy, and economical to implement in nursing practice. Blood pressure reduction may be influenced not only by the intervention but also by other factors such as medication adherence, sleep patterns, salt intake, and the psychological state of the elderly, who are more relaxed during therapy.

This study has several limitations, including a small sample size from a single location, the absence of a control group, and a relatively short intervention duration, which preclude a definitive evaluation of long-term effectiveness. Furthermore, the researchers did not fully control for external daily confounding factors in the elderly, such as variations in salt intake, physical activity levels, and adherence to antihypertensive medication. There is also the possibility of measurement bias and susceptibility to the Hawthorne effect, where respondents may unknowingly improve their health behaviors because they are being observed and measured in the study.

CONCLUSION

Based on the research results and discussion, it can be concluded that the combination of a warm-water foot soak and a foot-massage roller application was associated with a significant reduction in blood pressure among elderly people with hypertension at UPTD PSLU Tresna Werdha Natar, South Lampung, in 2025. Before the intervention, most respondents were in the Stage 2 hypertension category, and then after the intervention, they experienced a decrease to predominantly Stage 1 hypertension with a significant decrease in average systolic and diastolic blood pressure. The paired-samples test showed $p < 0.001$, indicating a significant difference between the pre- and post-intervention scores. This decrease in blood pressure was supported by physiological mechanisms, including vasodilation of blood vessels and increased relaxation through activation of the parasympathetic nervous system. Thus, this combination of therapies can be considered as a safe, easy-to-implement, non-pharmacological intervention to help control blood pressure in elderly people with hypertension, although other factors, such as age, physical activity, and individual health conditions, should still be considered.

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