Volume 13, Issue 3, 2025: 335-348
p-ISSN 2354-7642 e-ISSN 2503-1856
Accredited by Directorate General of Higher Education, Research and Technology, Republic of Indonesia No. 35/E/KPT/2019

Jurnal Ners dan Kebidanan Indonesia
(Indonesian Journal of Ners and Midwifery)
DOI : http://dx.doi.org/10.21927/jnki.2025.13(3).335-348
Available online at: http:ejournal.almaata.ac.id/index.php/JNKI

Foot massage and warm foot soak for lowering blood pressure in pregnant women with hypertension

Magdalena Martha Tompunuh*, Endah Yulianingsih, Ika Suherlin, Yollanda Dwi Santi Violentina, Nurfaizah Alza, Nanda Wahyudi, Sri Sujawaty, Hasnawatty Surya Porouw

Department of Midwery, Poltekkes Kemenkes Gorontalo, Indonesia
Jalan Taman Pendidikan, Moodu, Kota Timur, Kota Gorontalo

Corresponding author : magdalenatompunuh@poltekkesgorontalo.ac.id

ABSTRACT

Background: *Hypertension during pregnancy remains one of the leading causes of maternal morbidity and mortality worldwide, particularly in low- and middle-income countries. This condition increases the risk of complications such as preeclampsia, preterm birth, and placental abruption. As pharmacological treatments may pose risks to both the mother and fetus, non-pharmacological interventions have gained interest as safer complementary approaches to managing hypertension in pregnancy.*
Objectives: *The purpose of this study was to evaluate and compare the effectiveness of foot massage therapy and warm water foot soaks in reducing blood pressure among pregnant women diagnosed with hypertension.*
Methods: *A quasi-experimental study with a non-equivalent control group design was conducted involving 72 pregnant women with hypertension. Participants were selected through purposive sampling and divided into two groups: one group (n=36) received foot massage therapy, while the other group (n=36) underwent warm water foot soaks. Both interventions were administered over a specific period, and blood pressure was measured before and after each session. The Wilcoxon Signed Ranks test was used to assess within-group changes, while the Mann–Whitney U test evaluated differences between the groups.*
Results: *The results demonstrated a statistically significant reduction in both systolic (p = 0.00) and diastolic (p = 0.02) blood pressure in the foot massage group. Conversely, the warm water foot soak group did not show significant changes in systolic (p = 0.021) or diastolic (p = 0.026) pressure. Comparative analysis revealed that foot massage therapy was significantly more effective than warm water foot soaks in lowering blood pressure.*
Conclusions: *Foot massage therapy is a more effective non-pharmacological intervention than warm water foot soaks for reducing blood pressure in hypertensive pregnant women. It offers a simple, safe, and cost-effective complementary strategy that can be integrated into prenatal care practices to improve maternal health outcomes.*

KEYWORD*: foot massage; hypertension; warm water foot soak*

Article Info :
Article submitted on April 22 , 2025
Article revised on June 06, 2025
Article accepted on August 25, 2025
Article Published on September 30, 2025

INTRODUCTION

Health development as part of national development is directed at improving the quality of human resources (1). Indicators of successful health development include reducing maternal and infant mortality rates. The maternal mortality rate (MMR) illustrates the problems of the status of pregnant women, giving birth, and postpartum women (2). The maternal mortality rate has decreased from 4,226 to 4,221 maternal deaths in Indonesia. In 2019, the most common causes of maternal death were bleeding (1,280 cases), hypertension during pregnancy (1,066 cases), and infection (207 cases) (2).

The regions' maternal mortality rate indicator is essential as a benchmark for health sector programs. The maternal mortality rate in Gorontalo Province in 2018 was 138.3/100,000 live births. This figure is significant compared to the national target of 102/100,000 live births. The highest cause of hypertension in pregnancy is 17%, bleeding is 14%, and infection and metabolic disorders are each 3% (3).

The maternal mortality rate in Gorontalo City was 9 cases in 2020, with the most common cause being hypertension (4). Based on the preliminary study, the incidence of hypertension in pregnant women at the Dungingi Health Center was 23 people, at the Kota Selatan Health Center, there were nine people, and at the Hulonthalangi Health Center, there were 21 people in 2021. Hypertension in pregnancy is common and is the main cause of maternal mortality. It occurs in 5% of all pregnancies (5). Mostly due to stressful conditions. Stress can narrow the blood vessels, and cause excessive gastric discharge. As a result, an individual will experience nausea, vomiting, early satiety, recurrent stomach pain and headaches. If these conditions happen continuously, it can lead to complications of hypertension (6).

Treatment of hypertension is not only with drugs, complementary medicine methods with massage therapy can be a good alternative choice in terms of benefits and safety. Massage is a non-invasive therapy that helps prevent further damage to the body. Massage helps relieve stress from the body when applied to the feet. Applying pressure to the feet helps in restoring the body's balance. It is also helpful in reducing pain, increasing blood flow, lowering blood pressure and cholesterol (7).

Research conducted by Sabattani et al. on pregnant women with preeclampsia showed that soaking their feet in warm water lowered blood pressure that reached nine mmHg at most (8). Soaking feet in warm water is one of the natural theraphythat aim to increase blood circulation, reduce edema, increase muscle relaxation, support heart health, relax muscles, relieve stress, and increase capillary permeability. Thus, it is useful on lowering blood pressure in pre-eclamptic pregnant women. Foot massage and warm water foot soaks have been studied for their effects on lowering blood pressure (9). However, non-pharmacological therapies such as foot massage and warm

water foot soak in Gorontalo City have never been carried out. This is due to limited health workers and facilities, so the treatment of hypertension only provides pharmacological therapy. Based on the phenomenon of many pregnant women experiencing hypertension, the researchers were interested in conducting research on foot massage and warm water foot soaks to lower blood pressure in pregnant women with hypertension in Gorontalo City.

MATERIALS AND METHODS

This study employed a quasi-experimental design with a non-equivalent control group approach. In this design, two groups of participants received different non-pharmacological treatments—foot massage therapy and warm water foot soaks—to assess and compare their effectiveness in lowering blood pressure. Although both groups received treatment, no traditional control group (receiving no intervention) was included. This approach was chosen to ethically ensure all participants received a potential benefit, given the health risks associated with unmanaged hypertension during pregnancy. The research was conducted in Gorontalo City, Indonesia, in March 2022. The study took place at local community health centers (Puskesmas) and maternal health clinics that routinely handle antenatal care for pregnant women diagnosed with hypertension. These settings provided a clinically relevant and accessible environment for implementing the interventions and collecting data. The study population comprised all pregnant women diagnosed with hypertension who were registered and actively receiving antenatal care in Gorontalo City during the study period. Based on available health records, the total population size was 60 individuals.

A total sampling technique was employed in this study, involving all 60 eligible participants. The inclusion criteria included pregnant women in their second or third trimester who were diagnosed with hypertension (systolic blood pressure ≥140 mmHg or diastolic blood pressure ≥90 mmHg), had no other high-risk pregnancy complications, and were willing to participate and provide informed consent. The sample was then divided into two treatment groups: 30 participants received foot massage therapy, while the remaining 30 participants underwent warm water foot soaks. Participants were grouped based on the order of clinic visits and scheduling availability, not through randomization, which is consistent with the non-equivalent control group design. The primary data collection instruments included standardized observation sheets to record participants' blood pressure measurements before and after each session. Additionally, Standard Operating Procedures (SOPs) were developed to ensure consistent application of the foot massage and warm water soak interventions. Blood pressure was measured using a digital sphygmomanometer that had been calibrated prior to the study. The interventions were conducted using clean

materials, including towels, warm water containers, and massage oils for the foot massage group.

Each participant underwent one of two interventions, namely foot massage therapy or a warm water foot soak. For the foot massage therapy, participants received a structured massage lasting 15-20 minutes per session, following a pre-determined protocol that focused on acu-pressure points and relaxation zones on the feet. The therapy was carried out in a quiet environment to optimize relaxation. Meanwhile, for the warm water foot soak, participants immersed their feet in warm water with a temperature of 38°C - 40°C for 15-20 minutes, with the water level reaching up to the ankles while they were seated in a relaxed position.

Both interventions were administered once daily for a specified number of sessions, typically five consecutive days. The procedures were conducted directly by the researcher, assisted by a trained research assistant responsible for documenting the inter-ventions and preparing the necessary tools and materials.

Blood pressure was measured immediately before and after each intervention session to observe both acute and cumulative effects. Data was recorded systematically on the observation sheets, and all procedures adhered to health and safety protocols for pregnant women.

Statistical analysis was performed using non-parametric tests due to the small sample size and non-randomized design. The Wilcoxon Signed Ranks Test was used to compare pre- and post-treatment blood pressure levels within each group (foot massage and warm water foot soak).

To evaluate differences in treatment effectiveness between the two groups, the Mann–Whitney U Test was applied. All tests were conducted at a significance level of $p < 0.05$. This study received official research approval from the Investment and One-Stop Integrated Services Office (DPMPTSP) of Gorontalo City, as stated in Recommendation Letter No. 503/DPMPTSP/RIP/346/V/2022, issued based on the request from the Acting Director of Poltekkes Gorontalo (Letter No. LB.02.01/4.3/7525/2022 dated May 10, 2022). The research was conducted within the working area of the Gorontalo City Health Office, including several public health centers (Puskesmas), from May 23 to November 23, 2022.

The study adhered to ethical guidelines and local regulations, respecting cultural norms and maintaining public order. The researcher reported to the head of each institution involved and ensured that all activities aligned with the approved research objectives. Informed consent was obtained from all participants, and confidentiality of personal data was maintained. One copy of the final research report was submitted to the relevant institutions upon completion of the study.

RESULTS AND DISCUSSION

RESULTS

Blood Pressure Changes Before and After Massage Intervention

This section presents the changes in systolic and diastolic blood pressure among pregnant women before and after receiving foot massage therapy. The descriptive statistics below show the central tendencies and variability in participants' blood pressure measurements across both time points. The data in **Table 1** indicate a clear reduction in both systolic and diastolic blood pressure following massage therapy. On average, systolic pressure decreased by nearly 9 mmHg, while diastolic pressure showed a notable reduction of over 15 mmHg.

To further clarify the distribution of blood pressure values before the intervention, **Table 2** present frequency distributions for systolic and diastolic pressures, respectively.

Table 1. Descriptive statistics of blood pressure before and after massage

Statistics	Blood Pressure Before (Systolic)	Blood Pressure Before (Diastolic)	Blood Pressure After (Systolic)	Blood Pressure After (Diastolic)
N (Valid)	18	18	18	18
Mean	127.78	90.56	118.89	75
Median	130	90	120	80
Std. Dev.	13.528	2.357	5.83	17.573
Minimum	100	90	110	20
Maximum	160	100	130	110
25th Pctl	120	90	117.5	70
50th Pctl	130	90	120	80
75th Pctl	130	90	120	80

Table 2. Blood pressure before and after massage

Pressure Type	Pressure (mmHg)	Frequency	Percent (%)	Cumulative Percent (%)
Before Massage				
Systolic	100	1	5.6	5.6
	110	1	5.6	11.1
	120	5	27.8	38.9
	130	8	44.4	83.3
	140	1	5.6	88.9
	150	1	5.6	94.4
	160	1	5.6	100
Diastolic	90	17	94.4	94.4
	100	1	5.6	100

After Massage				
Systolic	110	4	22.2	22.2
	120	12	66.7	88.9
	130	2	11.1	100
Diastolic	20	1	5.6	5.6
	60	2	11.1	16.7
	70	3	16.7	33.3
	80	10	55.6	88.9
	90	1	5.6	94.4
	110	1	5.6	100

Table 2 shows that the majority of participants (44.4%) had a systolic pressure of 130 mmHg before receiving the massage, while smaller proportions recorded higher readings of 150 and 160 mmHg, indicating a moderate to high range of initial blood pressure. For diastolic pressure, almost all participants (94.4%) were at 90 mmHg, reflecting a uniform baseline level of hypertension across the group. Following the massage therapy, notable improvements were observed. Two-thirds of participants (66.7%) experienced a reduction in systolic pressure to 120 mmHg, indicating a substantial shift toward normal blood pressure levels. Similarly, more than half (55.6%) recorded diastolic pressures of 80 mmHg, with some achieving even lower values, suggesting enhanced cardiovascular regulation after the intervention.

To determine whether these reductions were statistically significant, Wilcoxon Signed Ranks Tests were performed for both systolic and diastolic pressures, as presented in **Table 3**.

Table 3. Wilcoxon signed ranks test for systolic and diastolic pressure before and after massage

Pressure Type	Test	Value
Systolic Pressure	Z	-3.704
	Asymp. Sig. (2-tailed)	0
Diastolic Pressure	Z	-3.115
	Asymp. Sig. (2-tailed)	0.002

As shown in **Table 3**, the p-value of 0.000 indicates a statistically significant reduction in systolic blood pressure after the massage intervention ($p < 0.05$). Also it demonstrates a significant reduction in diastolic pressure after the massage ($p = 0.002$), confirming the effectiveness of foot massage in lowering both components of blood pressure.

Blood Pressure Changes Before and After Warm Water Foot Soak

This section presents the findings from 11 respondents who received warm water foot soak therapy. The descriptive statistics reveal the central tendencies and ranges of both systolic and diastolic blood pressure measurements taken before and after the intervention. **Table 4** displays the mean, median, and range of systolic and diastolic blood pressures before and after the warm water foot soak intervention.

Table 4. Descriptive statistics of blood pressure before and after foot soak

Statistics	Before - Systolic	Before - Diastolic	After - Systolic	After - Diastolic
N (Valid)	11	11	11	11
Mean	128.18	88.18	119.09	80
Median	130	90	120	80
Std. Dev.	13.28	6.03	9.439	6.325
Minimum	110	70	110	70
Maximum	160	90	140	90

The data in **Table 4** show a decrease in both systolic and diastolic blood pressure after the intervention. However, the standard deviation remains relatively wide, especially in the post-treatment diastolic readings, indicating variation in individual responses. To better understand the distribution of pre-intervention systolic blood pressure among the respondents, **Table 5** presents the frequency of values recorded before the foot soak therapy.

Table 5. Blood pressure before and after foot soak

Pressure Type	Pressure (mmHg)	Frequency	Percent (%)	Cumulative Percent (%)
Before Massage				
Systolic	110	1	5.6	9.1
	120	4	22.2	45.5
	130	4	22.2	81.8
	140	1	5.6	90.9
	160	1	5.6	100
Diastolic	70	1	5.6	9.1
	90	10	55.6	100
After Massage				
Systolic	110	4	22.2	36.4
	120	5	27.8	81.8
	130	1	5.6	90.9
	140	1	5.6	100
Diastolic	70	2	11.1	18.2
	80	7	38.9	81.8
	90	2	11.1	100

Table 5 shows that most respondents had moderate systolic hypertension before the intervention, with the highest frequencies recorded at 120 and 130 mmHg. For diastolic pressure, the majority of participants were at 90 mmHg, further confirming the hypertensive status of the sample prior to treatment. After undergoing warm water foot soak therapy, improvements were observed in both systolic and diastolic values. Several participants achieved a post-intervention systolic pressure of 120 mmHg or lower, although the reduction was modest and varied among individuals. In terms of diastolic pressure, a moderate improvement was evident, with 7 out of 11 participants reaching 80 mmHg, while two individuals remained at the hypertensive level of 90 mmHg. To assess whether these reductions were statistically significant, the Wilcoxon Signed Ranks Test was applied, as presented in **Table 6**.

Table 6. Wilcoxon signed ranks test – systolic and diastolic blood pressure

Pressure Type	Test	Value
Systolic Pressure	Z	-2.226
	Asymp. Sig. (2-tailed)	0.026
Diastolic Pressure	Z	-2.31
	Asymp. Sig. (2-tailed)	0.021

As presented in **Table 6**, the Wilcoxon test yielded a *p*-value of 0.026 for systolic blood pressure, which is statistically significant ($p < 0.05$). This suggests that the intervention may have had a mild but real effect on lowering systolic pressure. However, this significance should be interpreted with caution due to the small sample size and variability.

Table 6 also shows a *p*-value of 0.021 for the change in diastolic blood pressure, indicating a statistically significant difference before and after the foot soak. This suggests that while the reduction was not as pronounced as in the massage group, the warm water foot soak did lead to a meaningful decline in diastolic pressure in some individuals.

In summary, the warm water foot soak resulted in modest improvements in both systolic and diastolic blood pressure, with statistically significant changes observed. However, the clinical effect appears less substantial and consistent compared to the massage intervention.

DISCUSSION

Effectiveness of Foot Massage in Lowering Blood Pressure

This study revealed contrasting outcomes between the two non-pharmacological interventions aimed at managing hypertension among pregnant women: warm water foot soak and foot massage therapy. Based on **Table 6**, the warm water foot soak intervention showed no statistically signifi-

cant differences in either systolic (p = 0.026) and diastolic (p = 0.021) blood pressure before and after therapy. As presented in **Table 4**, the mean systolic pressure decreased from 128.18 mmHg to 119.09 mmHg, while the mean diastolic pressure dropped from 88.18 mmHg to 80.00 mmHg. Although these values, further detailed in **Table 5**, indicate a downward trend, the changes did not reach a level of statistical significance. Several factors may explain this outcome, including the small sample size (n = 11) and the presence of missing data, which reduced the statistical power of the analysis. In addition, physiological adaptations during pregnancy, such as increased blood volume and hormonal fluctuations, may have blunted the hypotensive response to warm water immersion.

The mechanism by which warm water foot soaks may reduce blood pressure involves heat conduction to the body, leading to vasodilation and muscle relaxation, thereby improving circulation and reducing vascular resistance (10). This process activates baroreceptors in the carotid sinus and aortic arch, sending signals to the medulla oblongata to modulate vascular tone and systolic pressure (11). As the ventricular muscles contract, blood flow becomes smoother and systolic pressure may decline (12), while isovolumetric ventricular relaxation during diastole further aids in reducing diastolic pressure (13). Despite these mechanisms, the absence of a significant effect in this study suggests that short-term or infrequent application, or the specific physiological state of pregnancy, may limit its therapeutic impact.

In contrast, the foot massage therapy demonstrated a statistically and clinically significant reduction in blood pressure. As shown in **Table 3**, the Wilcoxon Signed Ranks Test indicated a significant decrease in both systolic pressure (p = 0.000) and diastolic pressure (p = 0.002). According to the descriptive statistics in **Table 1**, the mean systolic pressure dropped from 127.78 mmHg to 118.89 mmHg, while the mean diastolic pressure decreased from 90.56 mmHg to 75.00 mmHg. These reductions, further detailed in the frequency distribution of **Table 2**, are not only statistically meaningful but also clinically relevant, shifting many participants from a hypertensive range to near-normal levels.

Massage therapy in pregnant women is typically administered using gentle techniques such as effleurage, a light stroking motion that improves circulation and reduces stress (14). Unlike conventional massage, this therapy is adapted to pregnancy, avoiding certain acupressure points that may trigger uterine contractions or discomfort (15,16). Massage has been shown to improve neurological function, muscle flexibility, circulation, digestion, pulmonary performance, and sleep quality (17). These multisystem benefits may account for the more consistent and significant reductions in blood pressure observed in this study. Although foot soak therapy may still offer benefits such as

reducing muscle tension, promoting circulation, and improving sleep (18,19), its hypotensive effects appear limited in pregnant women. The heat-induced expansion of tissues and increased metabolic exchange (20), as well as improved vascular tone and permeability (21,22), may be insufficient alone to counteract the complex cardiovascular adaptations of pregnancy.

In summary, while both methods are safe and potentially supportive in prenatal care, this study suggests that foot massage therapy is more effective than warm water foot soaks in lowering blood pressure among hypertensive pregnant women.

Physiological Mechanisms of Blood Pressure Reduction

The effectiveness of both foot massage and warm water foot soak therapy in lowering blood pressure can be attributed to their influence on the cardiovascular and nervous systems. Foot massage activates the parasympathetic nervous system, promoting relaxation, reducing heart rate, and inducing vasodilation, which collectively contribute to decreased blood pressure. This therapy also reduces the secretion of stress-related hormones such as cortisol and adrenaline, which are known to elevate blood pressure, particularly during pregnancy. By alleviating both physical and emotional stress, massage therapy helps stabilize cardiovascular function and improve overall maternal well-being. In this study, most participants receiving foot massage experienced reductions in both systolic and diastolic blood pressure, supporting the calming and regulatory effect of massage on the autonomic and cardiovascular systems.

Meanwhile, warm water foot soak therapy operates through the principle of heat conduction, where warmth from the water promotes vascular dilation and muscle relaxation, thereby enhancing blood circulation and lowering peripheral resistance. This process is regulated through baroreceptors in the carotid sinus and aortic arch, which detect arterial stretch and signal the medullary cardiovascular center to modulate blood pressure (10). As the ventricular muscles contract, dilated blood vessels allow smoother ejection of blood, lowering systolic pressure (11). During diastole, ventricular relaxation and vessel dilation further reduce resistance, contributing to a drop in diastolic pressure (12, 13).

While both therapies share mechanisms related to vascular tone and autonomic regulation, this study found foot massage to have a more substantial and statistically significant impact on blood pressure, likely due to its direct influence on neurohormonal pathways and stress reduction.

Clinical Relevance and Practical Application

Although this study found no statistically significant impact of warm water foot soak therapy on blood pressure reduction, the intervention still holds clinical value as a supportive, non-invasive therapy. Prior studies have demonstrated that warm water

soaks can alleviate joint pain, reduce muscle tension, and improve sleep quality, particularly among older adults (18,19). The application of heat promotes vasodilation, decreases blood viscosity, and facilitates metabolic and chemical exchange in tissues, all of which can contribute to overall circulatory health (20, 21). However, in the specific context of hypertension in pregnant women, warm water foot soaks alone appear insufficient to produce a clinically meaningful reduction in blood pressure levels. Therefore, their best use may be as adjunctive therapy, in combination with other interventions such as massage or guided relaxation.

In contrast, foot massage therapy demonstrated both statistically and clinically significant effects. As shown in **Table 2**, following the intervention, 66.7% of participants achieved a systolic blood pressure of 120 mmHg, while 55.6% recorded a diastolic pressure of 80 mmHg—values that align with the recommended target range for blood pressure during pregnancy. These improvements, supported by the statistical results in **Table 3**, not only meet significance thresholds but also provide tangible therapeutic benefits, particularly in lowering the risks associated with hypertensive disorders of pregnancy, including preeclampsia, preterm birth, and intrauterine growth restriction.

Furthermore, foot massage is safe, cost-effective, and easy to administer, making it well-suited for use in diverse healthcare settings. It can be performed by trained health professionals, midwives, or even caregivers under supervision, thus offering a flexible intervention for blood pressure control that is accessible in both urban clinics and rural maternal care programs.

Practice Implications and Recommendations for Prenatal Care

While warm water foot soak therapy contributes to general maternal comfort and relaxation, its role in controlling hypertension during pregnancy appears limited. Health professionals may consider incorporating it into holistic maternal care to help manage mild physical discomfort and promote relaxation, but it should not be relied upon as the sole strategy for managing elevated blood pressure in pregnant women. Instead, this intervention is better positioned as an adjunctive method within a broader prenatal wellness program.

In contrast, foot massage therapy demonstrated significant cardiovascular benefits in this study and is supported by its ability to reduce both systolic and diastolic blood pressure to near-normal levels. These findings suggest that foot massage can be integrated into routine prenatal care protocols, particularly for managing mild to moderate hypertension. This intervention is safe, low-cost, and does not require complex equipment, making it especially feasible for implementation in resource-limited or rural healthcare settings. To support its effective application, Standard Operating Procedures (SOPs) and training modules can be

developed for midwives, nurses, and community health workers. By incorporating foot massage into regular antenatal visits, healthcare providers can enhance patient satisfaction, increase compliance with care recommendations, and potentially reduce dependence on pharmacological treatments, which are often limited during pregnancy due to concerns about fetal safety.

Future research should explore the combined effects of non-pharmacological therapies such as massage, relaxation techniques, and warm water soaks, delivered in structured and repeated sessions. Larger sample sizes, longer follow-up periods, and the inclusion of psychological variables —such as stress and anxiety levels—could provide a more comprehensive view of maternal health outcomes and better inform best practices in antenatal care.

CONCLUSIONS AND RECOMMENDATION

The findings of this study indicate that foot massage therapy is effective in reducing blood pressure among pregnant women with hypertension. Statistical analysis showed a significant decrease in both systolic ($p = 0.00$) and diastolic ($p = 0.02$) blood pressure after the massage intervention. In contrast, the warm water foot soak did not show a significant effect on either systolic ($p = 0.021$) or diastolic ($p = 0.026$) blood pressure.

Based on these results, foot massage therapy can be recommended as a complementary approach to help manage hypertension in pregnant women. Health practitioners are encouraged to consider incorporating this method into antenatal care programs. Further research is recommended to explore the long-term effects and optimal duration of therapy.

REFERENCES

1. Sari LL, Rati Astuti E. Peran bidan seba gai motivator dalam promosi kesehatan pada ibu hamil. Jurnal Asuhan Ibu dan Anak. 2020 Aug 31;5(2):19–24. https://doi.org/10.33867/jaia.v5i2.185
2. Astuti ER, Nurdiati RDS, Rokhanawati D. Pengaruh pemberian asi terhadap lama masa nifas di puskesmas trucuk I. Jurnal Kebidanan dan Keperawatan Aisyiyah. 2018 Apr 30;12(1):69–76. https://doi.org/ 10.31101/jkk.127
3. Kementerian Kesehatan Republik Indonesia. Profil Kesehatan Indonesia Tahun 2019 [Internet]. Jakarta; 2020 [cited 2025 Aug 6]. Available from: https://kemkes.go.id/id/profil-kesehatan-indonesia-2019
4. Dinas Kesehatan Provinsi Gorontalo. Profil Kesehatan Tahun 2018 [Internet]. Gorontalo; 2019 [cited 2025 Aug 6]. Available from: https://dinkes.gorontaloprov.go.id/profil-kesehatan/
5. Astuti ER, Husain FI, Sujawaty S. Literature review: Factors associated with hypertension in pregnancy. Journal Health & Science : Gorontalo Journal Health and Science Community. 2022 Oct 28;6(3):284–92. https://doi.org/10.35971/gojhes.v6i3.16523

6. Balwan WK, Kour S. A systematic review of hypertension and stress-the silent killers. Scholars Academic Journal of Biosciences. 2021;9(6):150-154. https://doi.org/10.36347/sajb.2021.v09i06.002
7. Aisyah S, Uliyah M, Ulfaiza M. The Effect of Foot Massage Using Lemongrass Oil on Reducing the Intensity of Rheumatoid Arthritis Pain in the Elderly at the Aisyiyah Clinic, Ambulu Sub-district, Jember Regency. In 2023. p. 148–58. https://doi.org/10.2991/978-94-6463-202-6_18
8. Ardiansyah M. Medikal bedah untuk mahasiswa. 1st ed. Dion, editor. Yogya karta: Yogyakarta Diva Press; 2012.
9. Elvira M, Sinthania D, Dewi DS, Asman A, Arif M. The Effect of Foot Soak Therapy Using Warm Water on the Lowering Blood Pressure in Patients with Essen tial Hypertension. South East Asia Nursing Research. 2023 Jun 25;5(2):23. https://doi.org/10.26714/seanr.5.2.2023.23-29
10. Sari LT, Yuliastanti Y, Yuniarti H. Litera ture Review: The Application of Soak Feet Warm Water Therapy on Decrease Blood Preassure In Elderly With Hyper tension. Midwifery and Nursing Research. 2021 Mar 31;3(1):13–6. https://ejournal.poltekkes-smg.ac.id/ojs/index.php/MANR/article/view/6593/0
11. Pramono JS, Arsyawina, Masita IK. Reducing Blood Pressure with Slow Stroke Back Massage and Warm Water Foot Soak on Isolated Systolic Hyper tension Patients. International Journal of Nursing and Health Services. 2021; 4(4):414–22. https://doi.org/10.35654/ijnhs.v4i4.467
12. Moini Jazani A, Nasimi Doost Azgomi H, Nasimi Doost Azgomi A, Nasimi Doost Azgomi R. Effect of hydrotherapy, balneotherapy, and spa therapy on blood pressure: a mini-review. Int J Bio meteorol. 2023 Sep 12;67(9):1387–96. https://doi.org/10.1007/s00484-023-02512-5
13. Sutisna MI, Rustandi B, Purwanti TF, Wulandari NA. The Effectiveness of Warm Water Foot Soaks and Progres sive Muscle Relaxation to Reduce Blood Pressure Among Patients with Hyper tension in Cihanjuang Rahayu Village, West Bandung, Indonesia. Asian Journal of Health and Applied Sciences. 2023; 2(3):16-21. https://doi.org/10.53402/ajhas.v2i3.384
14. Tompunuh MM, Astuti ER. Pijat Kaki pada Ibu Hamil Hipertensi. Gorontalo: CV. Mitra Keluarga Sehat; 2023.
15. Retni A, Umani RP. The Effect of Giving Effleurage Massage Techniques on Reduction of Labor Pain in Labor Pain in Women in Labor. Journal of Community Health Provision. 2023 Jul 20; 3(2): 39-47. https://doi.org/10.55885/jchp.v3i2.267
16. Astuti H, Syafriani S. Effleurage Massage and Acupressure's Effectiveness in Reducing Labor Pain in Active Phase of First-Stage Labor at Tembilahan Hulu

Health Center, Riau. Journal of Health and Nutrition Research. 2025 Apr 20; 4(1):62–72. https://doi.org/10.56303/jhnresearch.v4i1.346

17. Utli H. Effects of Massage Therapy on Clinical Symptoms of Older People. Journal of Education and Research in Nursing. 2022 Apr 7;18(1):103–7. https://doi.org/10.5152/jern.2021.09327
18. Dareda K, Iman DP, Wicaksana MW. The Effect Of Foot Soak Therapy Using Warm Water On Reducing Blood Pressure In Hypertension Patients. Jurnal EduHealth. 2023;14(04):656–62. https://ejournal.seaninstitute.or.id/index.php/healt/article/view/3594
19. Afriannisyah E, Syafitasari J, Putri PS. Foot soak device to improve sleep quality for pregnant women. Science Midwifery. 2024;12(4):1486–92. https://doi.org/10.35335/midwifery.v12i4.1699
20. Timah S. The Effect Of Foot Soak Hydrotherapy With Warm Water On Lowering Blood Pressure In Elderly Patients With Hypertension. International Journal of Nursing Excellence. 2024;1(1):24–9. https://journal.nusakreatif.com/index.php/ijne/article/view/9
21. Setiawan LRS, Mardiyono, Santjaka A. The Effectiveness of Acupressure and Warm Foot Soak Hydrotherapy on Increasing Muscle Strength and Range of Motion among Non-Hemorrhagic Stroke Patients. International Journal of Nursing and Health Services. 2021; 4(4):430–9. https://doi.org/ 10.35654/ijnhs. v4i4.486
22. Mulya C, Sulistyowati D, Astuti AB. Improving Sleep Quality and Blood Pressure Through Warm Foot Soak in the Elderly. Interest : Jurnal Ilmu Kesehatan. 2025 Apr 24;83–9. https://doi.org/10.37341/interest.v12i1.715