

The Effectiveness of Warm Water and Epsom Salt Soaks for Lowering Blood Pressure in Hypertensive Patients

Sabiela¹, Ketut Suryani², Veroneka Yosefpa Windahandayani³

^{1,2,3}Nursing Study Program, Faculty of Health Sciences, Misi Charitas Catholic University, Palembang, Indonesia

Corresponding Author: sabiela20@gmail.com

ABSTRACT

Uncontrolled hypertension can cause serious complications and organ damage. This study aims to compare the effectiveness of warm water immersion and saltwater immersion in lowering blood pressure among patients with hypertension. This quantitative quasi experimental study used a two group pretest posttest design without a control group. A total of fifty respondents were selected using purposive sampling, with twenty five respondents in each group. Participants were aged nineteen to fifty nine years, diagnosed with hypertension at Padang Selasa Health Center, and willing to participate. Data were collected through door to door visits using a sphygmomanometer and stethoscope. Data analysis included univariate analysis and Wilcoxon and Mann Whitney tests. Most respondents were over fifty years old. Women accounted for ninety six percent in one group and seventy six percent in the other group. Blood pressure differed significantly before and after warm water immersion and saltwater immersion. However, no significant difference in effectiveness was found between the two interventions. This study contributes to nursing knowledge regarding non pharmacological hypertension management. Comparing both interventions may expand the literature on complementary therapies and clarify whether adding salt provides different effects on blood pressure reduction. For respondents, this study may improve knowledge of warm water and saltwater immersion as complementary approaches to blood pressure control. The research site can serve as an educational resource. For nursing higher education institutions, this study may serve as a scientific reference on non pharmacological hypertension management. For future researchers, it may provide a basis for further studies considering water temperature, water volume, salt quantity, and intervention procedures. Unlike previous studies using table salt, this study uses magnesium containing Epsom salt to compare warm water immersion with saltwater immersion and determine their effectiveness in lowering blood pressure.

Keywords: Hypertension, Blood Pressure, Soak, Warm Water, Salt.

1. INTRODUCTION

High blood pressure can be managed through various non-pharmacological methods; one such intervention is foot-soaking therapy using warm water and salt. This type of therapy contributes to changes in blood pressure. Soaking the feet in warm water helps relax the muscles surrounding blood vessels, which in turn leads to vasodilation (widening of the blood vessels). This dilation reduces resistance to blood flow, resulting in a decrease in blood pressure. Meanwhile, in foot-soaking therapy using salt water, the magnesium content can be absorbed through the skin into the bloodstream, helping to dilate blood vessels and relax muscles, which can also lower blood pressure. Based on this, the research question for this study is: is there a difference in effectiveness between warm-water foot soaks and salt-water foot soaks in reducing blood pressure among individuals with hypertension.

2. LITERATURE REVIEW / THEORETICAL FRAMEWORK

Based on research conducted by Kristiningtyas (2023), a p-value of 0.0001 (<0.05) was obtained, leading to the conclusion that there is a significant difference in the mean systolic and diastolic blood pressure before and after warm-water foot soak therapy. Research by Chaidir (2022) yielded a p-value of 0.000 (<0.05), indicating that warm-water foot soak therapy has an effect on reducing blood pressure in hypertensive patients. In a study by Widyaswara (2022), a p-value of 0.000 (<0.05) was found for systolic blood pressure, and a p-value of 0.061 (<0.05) for diastolic blood pressure; it can be concluded that there is a significant difference in blood pressure following warm-water foot soak therapy among elderly individuals with hypertension. Research by Irawan (2022) resulted in a p-value of 0.000 (<0.05), suggesting that a saltwater foot soak is effective in lowering blood pressure in elderly individuals with hypertension. Finally, research by Loke (2022) yielded a p-value of 0.000 (<0.05), indicating that a foot soak using warm water mixed with salt has a significant effect on changes in blood pressure.

Hypothesis/Proposition (if applicable):

- a. Differences in Blood Pressure Before and After Warm-Water Soaking Therapy in Patients with Hypertension

Based on the results obtained, a p-value of 0.001 was found, leading to the rejection of the null hypothesis H_0 . This indicates a significant difference in blood pressure before and after warm-water soaking therapy among patients with hypertension. This study aligns with research conducted by Malibel (2020), which reported a p-value of 0.000—resulting in the rejection of H_0 and demonstrated a difference between pre-test and post-test results in an intervention group receiving hydrotherapy (warm-water foot soaking) for blood pressure reduction in hypertensive patients.

- b. Differences in Blood Pressure Before and After Salt-Water Soaking Therapy in Patients with Hypertension

Based on the results obtained, a p-value of 0.000 was found, leading to the rejection of the null hypothesis H_0 . This indicates that there is a significant difference in blood pressure before and after salt-water soaking therapy among patients with hypertension. This study aligns with research conducted by Rohmah (2023), which reported a p-value of 0.002 (<0.005)—resulting in the rejection of the null hypothesis and demonstrated that soaking one's feet in warm water mixed with additives leads to changes in blood pressure in patients with hypertension.

- c. Difference in Effectiveness Between Warm Water Soaks and Salt Water Soaks on Blood Pressure in Patients with Hypertension

Based on the results obtained, the calculated z-value is -0.074, and the table z-value is 0.2266. Since the calculated z-value is less than the table z-value, the null hypothesis (H_0) is accepted. With a p-value of 0.941, H_0 is accepted, indicating that there is no difference in effectiveness between warm water soaks and salt water soaks regarding blood pressure in patients with hypertension.

Based on this analysis, the researcher concludes that there is no significant difference in effectiveness between warm water soaks and salt water soaks; both have an equivalent effect on lowering blood pressure. However, there is a difference in the observed outcomes following the intervention, with a higher number of respondents in the salt water soak group experiencing a decrease in blood pressure compared to those in the warm water soak group.

3. RESEARCH METHOD

The study employs a quasi-experimental design without a control group—specifically, a two-group pretest-posttest design involving two intervention groups. Blood pressure is measured both before and after the intervention to determine the outcomes for the groups undergoing warm-water soaking and salt-water soaking, respectively. This research design was chosen because the objective is to identify differences in blood pressure following the administration of warm-water and salt-water soaking therapies.

In this study, the population consisted of 103 respondents from the Padang Selasa Community Health Center (Puskesmas) who had been diagnosed with hypertension within the last month (September).

In this study, the sample was selected using a purposive sampling technique—a sampling method based on specific criteria or considerations aligned with the research objectives and requirements. The study sample consists of 50 individuals with hypertension, with 25 respondents assigned to the intervention group receiving warm-water foot soaks, and 25 respondents assigned to the intervention group receiving saltwater foot soaks.

The data collection procedure involved administering warm-water soaks and salt-water soaks, with blood pressure measurements taken both before and after the intervention.

Data collection involved monitoring blood pressure in the context of warm-water soak therapy and salt-water soak therapy. For the warm-water soak group, data were recorded using observation sheets, and a mercury thermometer was used to monitor water temperature; the intervention was conducted over three consecutive days, with each session lasting 15 minutes at a water temperature of 40°C. In each session, blood pressure was measured twice: 5 minutes before the intervention and 5 minutes after the intervention, using a sphygmomanometer, a stethoscope, and an observation sheet. For the salt-water soak group, data were recorded using observation sheets, and a mercury thermometer was used to monitor water temperature; the intervention was conducted over three consecutive days, with each session lasting 15 minutes at a water temperature of 40°C, using 3 tablespoons of salt. In each session, blood pressure was measured twice: 5 minutes before the intervention and 5 minutes after the intervention, using a sphygmomanometer, a stethoscope, and an observation sheet.

In this study, the instruments used to collect data were an observation sheet, a sphygmomanometer, a stethoscope, and a water thermometer.

In this study, the Wilcoxon test is used to determine the differences in blood pressure before and after the warm-water soak intervention, as well as before and after the salt-water soak intervention. Subsequently, the Mann-Whitney test is employed to examine the differences in blood pressure following the warm-water soak versus the salt-water soak. The significance level assessed via the p-value is crucial for determining whether a difference exists between the independent and dependent variables. If the p-value is less than 0.05, the null hypothesis is rejected and the alternative hypothesis is accepted, indicating a significant difference between the independent and dependent variables; conversely, if the p-value is greater than 0.05, the null hypothesis is accepted and the alternative hypothesis is rejected, indicating no significant difference between the independent and dependent variables.

4. RESULTS

- a. Differences in Blood Pressure Before and After the Warm-Water Immersion Therapy in Patients with Hypertension (n=25)

<i>Ranks</i>	<i>Frequency (N)</i>	<i>Mean Rank</i>	<i>p-value</i>
Decrease	15	8,57	0,001
Increase	1	7,50	
No change	9		
Total	25		

Sabiela (2025)

Based on the pre-test and post-test blood pressure data for the warm-water soak therapy group analyzed using the Wilcoxon test 15 respondents experienced a decrease in blood pressure (with a mean rank of 8.57), while 1 respondent experienced an increase in blood pressure (with a mean rank of 7.50). Consequently, a p-value of 0.001 was obtained, leading to the rejection of the null hypothesis (H_0); this indicates a significant difference in blood pressure before and after the warm-water soak therapy among individuals with hypertension.

- b. Differences in Blood Pressure Before and After the Salt-Water Soak Therapy in Patients with Hypertension (n=25)

<i>Ranks</i>	<i>Frequency (N)</i>	<i>Mean Rank</i>	<i>p-value</i>
Decrease	23	12,00	0,000
Increase	0	0,00	
No change	2		
Total	25		

Sabiela (2025)

Based on Table, which presents the pre-test and post-test blood pressure data for the group receiving the salt-water soak therapy, the Wilcoxon test indicates that 23 respondents experienced a decrease in blood pressure (with a mean rank of 9.13), while none showed an increase. Consequently, a p-value of 0.000 was obtained, leading to the rejection of the null hypothesis (H_0). This signifies that there is a statistically significant difference in blood pressure before and after the salt-water soak therapy among individuals with hypertension.

- c. Difference in Effectiveness Between Warm Water Soaks and Salt Water Soaks on Blood Pressure in Individuals with Hypertension (n=50)

<i>Groups</i>	<i>Mean Rank</i>	<i>Z</i>	<i>p-value</i>
Warm Water Soak	25,62	-0,074	0,941
Salt Water Soak	25,38		
Mean Difference	0,24		

Sabiela (2025)

Table shows the results of the Mann-Whitney test comparing post-test blood pressure between the warm-water soak and salt-water soak therapy groups. The analysis yielded a p-value of 0.941; therefore, the null hypothesis (H_0) is accepted, indicating no significant difference in effectiveness between warm-water soaks and salt-water soaks regarding blood pressure in individuals with hypertension. However, an examination of the mean ranks reveals a value of 25.62 for the warm-water soak group and 22.38 for the salt-water soak group, representing a difference in mean rank of 0.24.

5. DISCUSSION

a. Differences in Blood Pressure Before and After Warm Water Immersion Therapy in Patients with Hypertension

Based on the results obtained, a p-value of 0.001 was found, leading to the rejection of the null hypothesis (H_0). This indicates a significant difference in blood pressure before and after the warm-water foot soak therapy among individuals with hypertension. This study aligns with research by Malibel (2020), which reported a p-value of 0.000 resulting in the rejection of H_0 and demonstrated a significant difference between pre-test and post-test results in an intervention group receiving hydrotherapy (warm-water foot soaks) for blood pressure reduction in hypertensive patients. Similarly, a study by Papeti (2025) yielded a p-value of 0.008, leading to the rejection of H_0 and confirming that warm-water foot soak therapy has a significant effect on the blood pressure of individuals with hypertension.

Soaking the feet in warm water is a simple therapeutic method that leverages the body's natural response to temperature, often categorized as a "low-tech" technique (Ambarsari, 2020, p. 222). This therapy can stimulate the activation of baroreceptors, which subsequently send signals to the brain to trigger the parasympathetic nervous system. The activation of these nerves plays a role in lowering the heart rate and reducing the force of cardiac contractions, thereby contributing to a decrease in blood pressure. When performed regularly, this therapy can improve blood circulation, help relax the nervous system, and support the natural stabilization of blood pressure in individuals with hypertension (Saputra et al., 2023, p. 121).

Based on the analysis, it can be concluded that warm-water foot soak therapy is effective in lowering blood pressure. This therapy is administered once daily for three consecutive days, with each session lasting 15 minutes and using water at a temperature of 40 degrees Celsius. The results showed that 15 respondents experienced a decrease in blood pressure from grade 1 hypertension to pre-hypertension as many as 8 respondents, grade 2 hypertension to pre-hypertension as many as 3 respondents, grade 2 hypertension to grade 1 hypertension as many as 3 respondents, pre-hypertension to normal as many as 1 respondent. There was 1 respondent experienced an increase in blood pressure from normal to pre-hypertension. There were 9 respondents who experienced stability or did not experience changes in blood pressure before and after the intervention, of which, 6 respondents remained at pre-hypertension and 3 respondents remained at grade 1 hypertension.

b. Differences in Blood Pressure Before and After Salt-Water Soak Therapy in Patients with Hypertension

Based on the results obtained, a p-value of 0.000 was found, leading to the rejection of the null hypothesis (H_0). This indicates a significant difference in blood pressure before and after the salt-water foot soak therapy among individuals with hypertension. This study aligns with research by Rohmah (2023), which reported a p-value of 0.002 (< 0.005), resulting in the rejection of H_0 and demonstrating that warm-water foot soaks (with additives) influence blood pressure changes in hypertensive patients. Similarly, this study is consistent with research by Komariah et al. (2025), which found a p-value of 0.000 (< 0.005) leading to the rejection of H_0 and showed that warm-water foot soaks (with additives) contribute to a reduction in blood pressure among those with hypertension.

Salt-water foot soak therapy involves using warm water mixed with salt to enhance blood circulation by dilating blood vessels, which can help reduce swelling in body tissues (Tresna A., 2023, p. 40). Such soaks are particularly beneficial for individuals with hypertension aiding in blood pressure reduction by increasing capillary permeability and providing warmth to the body (Uliya, 2020, p. 90). According to Malingkes et al. (2015), as cited in Udani (2022, p. 17), magnesium can be absorbed through the skin, thereby increasing blood magnesium levels, which in turn affects cardiac function. Magnesium plays a crucial role in regulating blood pressure; alterations in blood magnesium levels can promote relaxation of vascular tone, ultimately influencing changes in blood pressure.

Based on this analysis, the researchers conclude that salt-water foot soak therapy can lower blood pressure. This therapy was carried out 1x/day in 3 consecutive days, for 15 minutes, with a water temperature of 40 degrees Celsius, with a salt content of 3 tablespoons. The results showed that 23 respondents experienced a decrease in blood pressure from grade 1 hypertension to pre-hypertension as many as 17 respondents, grade 2 hypertension to pre-hypertension as many as 1 respondent, grade 2 hypertension to grade 1 hypertension as many as 1 respondent, pre-hypertension to normal as many as 4 respondents. There were 2 respondents who experienced stability or did not experience changes in blood pressure before and after the intervention, of which number, 1 respondent remained at pre-hypertension and 1 respondent remained at grade 2 hypertension.

c. Differences in the Effectiveness of Warm Water Soaks versus Salt Water Soaks on Blood Pressure in Individuals with Hypertension

Based on the results obtained, the calculated z-value is -0.074, while the table z-value is 0.2266. Since the calculated z-value is less than the table z-value, the null hypothesis (H_0) is accepted. With a p-value of 0.941, H_0 is accepted, indicating no significant difference in effectiveness between warm-water soaks and saltwater soaks regarding blood pressure in individuals with hypertension.

The researcher concludes that there is no difference in effectiveness between warm-water soaks and saltwater soaks; both have an equivalent effect on lowering blood pressure. However, there is a variation in the outcomes following the intervention, with a higher number of respondents in the saltwater soak group experiencing a decrease in blood pressure compared to those in the warm-water soak group.

During the observation of the warm-water soak group, changes in blood pressure were noted from the first to the third day. On the first day, 10 respondents experienced a decrease in both systolic and diastolic blood pressure; 7 respondents showed a decrease only in systolic pressure, 5 respondents showed a decrease only in diastolic pressure, and 3 respondents showed no change. The second day followed a similar pattern: 10 respondents experienced a decrease in both systolic and diastolic pressure, 8 respondents showed a decrease only in systolic pressure, 5 respondents showed a decrease only in diastolic pressure, and 2 respondents showed no change. By the third day, the number of respondents experiencing a decrease in both systolic and diastolic pressure rose to 12, while 7 respondents showed a decrease only in systolic pressure, 5 respondents showed a decrease only in diastolic pressure, and only 1 respondent showed no change. Based on these findings, warm-water soaks were most effective in reducing either systolic or diastolic blood pressure (affecting an average of 12 respondents), while a reduction in both systolic and diastolic blood pressure was observed in an average of 10 respondents.

During the observation of the saltwater soak group, changes in blood pressure were also observed from the first to the third day. On the first day, 18 respondents experienced a decrease in both systolic and diastolic blood pressure; 4 respondents showed a decrease only in systolic pressure, 1 respondent showed a decrease only in diastolic pressure, and 2 respondents experienced no change in blood pressure. On the second day, 15 respondents experienced a decrease in both systolic and diastolic pressure, 4 respondents showed a decrease only in systolic pressure, 5 respondents showed a decrease only in diastolic pressure, and 1 respondent showed no change. On the third day, 14 respondents experienced a decrease in both systolic and diastolic pressure, 5 respondents showed a decrease only in systolic pressure, 3 respondents showed a decrease only in diastolic pressure, and 3 respondents experienced no change in blood pressure. Based on these research findings, soaking in salt water was most effective in reducing both systolic and diastolic blood pressure (observed in an average of 15 respondents), while a reduction in either systolic or diastolic blood pressure was observed in an average of 7 respondents.

Based on these results, the warm-water soak therapy group showed a decrease in systolic and diastolic blood pressure (with an average of 10 respondents), while the saltwater soak therapy group also showed a decrease in systolic and diastolic blood pressure (with an average of 15 respondents). It can be concluded that saltwater soak therapy is more effective in lowering blood pressure, as it reduces both systolic and diastolic blood pressure, with an average of 15 respondents.

According to theoretical concepts, both warm-water and saltwater soaks facilitate the dilation of blood vessels and promote muscle relaxation, which in turn helps lower blood pressure. Factors influencing the effectiveness of these soaks include the positioning of the feet, the water level (covering the area above the ankles), a water temperature ranging from 40.5–43°C, the amount of salt used (for the saltwater group), and a soaking duration of 20–30 minutes (Uliya, 2020, p. 90).

6. CONCLUSION

- There is a difference in blood pressure before and after the warm-water soak therapy in patients with hypertension ($p=0.001$).
- There is a difference in blood pressure before and after the salt-water soak therapy in patients with hypertension ($p=0.000$).
- There is no difference in effectiveness between warm-water soak therapy and salt-water soak therapy regarding blood pressure in patients with hypertension ($p=0.941$).
- A limitation of the study is that, during the data collection process, certain actions did not follow the established procedures; the researcher failed to consider that adding more water would reduce the salt concentration during the soaking phase.
- This study should be conducted in accordance with established procedures—taking into account factors such as temperature, the quantity of water and salt, or the inclusion of other alternative therapies to observe differences in effectiveness—and, when implementing an intervention, one of the two approaches should be selected to ensure more effective results in lowering blood pressure.

CONFLICT OF INTEREST

The authors declare no conflict of interest related to this study

REFERENCES

- Adawiyah, R. and Hasaini, A. (2025) ‘Pengaruh Rendam Kaki Air Hangat Garam dengan Penurunan Tekanan Darah Pada Penderita Hipertensi’, 2(1), pp. 1–29. Available at: <https://doi.org/10.54004/join.v2i1.163>.
- Akhmad (2023) ‘Faktor-Faktor yang Berhubungan dengan Kejadian Hipertensi di Kelurahan Kapuas Kanan Hulu Kecamatan Sintang Tahun 2023’, *Jurnal Ventilator*, 1(3), pp. 332–352. Available at: <https://doi.org/10.59680/ventilator.v1i3.968>.
- Al-Rasyid, N.H.S. *et al.* (2022) ‘Tingkat Kepatuhan Minum Obat Pasien Hipertensi di Puskesmas Lempake Samarinda’, *Jurnal Kedokteran Mulawarman*, 9, pp. 55–63.
- Alifah, F., Fajria, L. and Herien, Y. (2023) *Pendidikan Kesehatan Bagi Remaja Putri Terkait “Menstruasi Hygiene”*. Edited by L. Fajria. Indramayu: CV. Adanu Abimata.
- Alifariki, L.O. (2019) *Epidemiologi Hipertensi (Sebuah Tinjauan Berbasis Riset)*. Yogyakarta: Penerbit Leutikaprio.
- Ambarsari, E.M., Ermianti and Hidayati, N.O. (2020) ‘Pengaruh Rendam Kaki Air Hangat dan Musik Klasik Terhadap Tekanan Darah Ibu Hamil dengan Hipertensi’, *Journal of Nursing Care*, 3(3), pp. 221–228. Available at: <https://doi.org/10.24198/jnc.v3i3.27284>.

- Anggraini, N.V. *et al.* (2025) 'Teratasi: Terapi Rendam Kaki Air Hangat dengan Epsom Salt untuk Hipertensi pada Lansia', *Jurnal Kreativitas Pengabdian Kepada Masyarakat (PKM)*, 8(4), pp. 2267–2276. Available at: <https://doi.org/10.33024/jkpm.v8i4.18688>.
- Anggraini, R. and Santosa, W.R.B. (2023) 'Hidroterapi Air Hangat Rendam Kaki Terhadap Tekanan Darah Lansia Penderita Hipertensi', *Jurnal Wiyata: Penelitian Sains dan Kesehatan*, 10(2), p. 49. Available at: <https://doi.org/10.56710/wiyata.v10i2.730>.
- Astutik, E.D.W., Sunarjo, L. and Rasipin (2021) *Terapi Rendam Kaki Menggunakan Air Hangat Dengan Epsom Salt Dan Lemongrass Oil Dalam Menurunkan Tekanan Darah Pada Ibu Hamil Hipertensi*. Semarang: Politeknik Kesehatan Kemenkes Semarang.
- Bell, K., Twiggs, J. and Olin, B.R. (2018) 'Hypertension : The Silent Killer : Updated JNC-8 Guideline Recommendations', *Continuing Education*, p. 4. Available at: https://cdn.ymaws.com/www.aparx.org/resource/resmgr/CEs/CE_Hypertension_The_Silent_K.pdf.
- Biahimo, N.U.I., Mulyono, S. and Herlinah, L. (2020) 'Perubahan Tekanan Darah Lansia Hipertensi Melalui Terapi Rendam Kaki Menggunakan Air Hangat', *Jurnal Ilmiah Umum dan Kesehatan Aisyiyah*, 5(1), pp. 9–16.
- Budiono, N.D., Budianto, N.E. and Inayah, Z. (2023) *Epidemiologi Penyakit Tidak Menular*. Edited by A.F. Qohar, A.F. Rohman, and S.A. Prayitno. Banjarnegara: PT. Penerbit Qriset Indonesia.
- Chaidir, R., Putri, A. and Yantri, K. (2022) 'Pengaruh Terapi Rendam Kaki Air Hangat Terhadap Tingkat Kecemasan Ibu Preeklampsia', *Afiyah*, 9(1), pp. 37–44.
- Chintya, Y. *et al.* (2023) *Teori Dan Praktik Keperawatan Medikal Bedah*. Edited by N. Sulung. Padang: Getpress Indonesia.
- Damanik, D. *et al.* (2024) *Metodologi Penelitian Pendidikan Dasar*. Edited by P.T. Cahyono. Batam: CV. Rey Media Grafika.
- Dewi, K.K. and Adibah (2023) *Buku Ajar Fisiologi Kedokteran Gigi Pemeriksaan Tanda Vital*. Klaten: Penerbit Nasmedia.
- Dina, S. (2021) *Diam-diam Mematikan, Cegah Asam Urat dan Hipertensi*. Edited by Adams Sony. Yogyakarta: Penerbit Anak Hebat Indonesia.
- Dinkes Sumsel (2021) *Profil Kesehatan Provinsi Sumatera Selatan Tahun 2021*. Palembang: Dinas Kesehatan Provinsi Sumatera Selatan.
- Dinkes Sumsel (2022) *Profil Kesehatan Provinsi Sumatera Selatan Tahun 2022, Dinkes Provinsi Sumatera Selatan*. Palembang: Dinas Kesehatan Provinsi Sumatera Selatan. Available at: <https://drive.google.com/file/d/1tdFCVQIxUyr80CYPdOYSAwUiwsJKzd98/view>.
- Dinkes Sumsel (2023) *Profil Kesehatan Provinsi Sumatera Selatan Tahun 2023*. Palembang: Dinas Kesehatan Provinsi Sumatera Selatan. Available at: https://pdf2.sumselgo.id/ppiddinkes/unggah/39010476-Profil_Kesehatan_Prov_Sumsel_2023.pdf.
- Ekasari, M.F. *et al.* (2021) *Hipertensi: Kenali Penyebab, Tanda Gejala Dan Penangannya, Hipertensi*. Edited by A. Jubaedi. Jakarta: Poltekkes Kemenkes Jakarta III.
- Fadhilah, A.H. *et al.* (2024) *Keperawatan Dasar*. Edited by P.T. Cahyono. Batam: Yayasan Cendikia Mulia Mandiri.
- Fildayanti, Dharmawati, T. and Putri, L.A.R. (2020) 'Pengaruh Pemberian Rendam Kaki Dengan Air Hangat Campuran Garam', *Jurnal Ilmiah Karya Kesehatan*, 01.
- Fitrawahyudi *et al.* (2022) *Vitalitas Bahasa Daerah Massenrempulu di Kabupaten Enrekang*. Edited

- by M. Nasrudin. Pekalongan: PT. Nasya Expanding Management.
- Fitrina, Y., Anggraini, D. and Anggraini, L. (2022) 'Pengaruh Rendam Kaki Air Hangat Garam dan Serai terhadap Tekanan Darah pada Lansia Hipertensi di Puskesmas Tigo Baleh Bukittinggi Tahun 2021', 9(1), pp. 70–80.
- Habibah, N., Dewi, T.K. and Ludiana (2025) 'Implementasi Rendam Kaki Air Hangat dengan campuran Garam terhadap Tekanan Darah Pasien Hipertensi', *Jurnal Cendikia Muda*, 5, p. 517.
- Harmoko *et al.* (2022) 'Buku Ajar Metodologi Penelitian'. Kupang: CV. Feniks Muda Sejahtera, p. 42.
- Husna, A. and Suryana, B. (2017) *Bahan Ajar Keperawatan Gigi : Metodologi Penelitian dan Statistik*. Jakarta: Kementerian Kesehatan RI.
- Ibrahim, S. and Hardjo, M. (2023) *Metodologi Penelitian Kesehatan*. Edited by J. Ibrahim and Hardjo Marsuki. Pekalongan: NEM-Anggota IKAPI.
- Ilham, S.A., Alami, R.R. and Damayanti, R.H. (2023) *Farmakologi Farmasi*. Edited by I.P. Kusuma. Batam: Yayasan Cendikia Mulia Mandiri.
- Iqbal, M.F. and Handayani, S. (2022) 'Terapi Non Farmakologi pada Hipertensi', *Jurnal Untuk Masyarakat Sehat (JUKMAS)*, 6(1), pp. 41–51. Available at: <https://doi.org/10.52643/jukmas.v6i1.2113>.
- Irawan, D., Asmuji and Yulis, Z.E. (2022) 'Pengaruh Rendam Kaki Air Garam Terhadap Penurunan Tekanan Darah Lansia Hipertensi', *Jurnal Keperawatan 'Aisyiyah'*, 9(2), pp. 119–125.
- Ismail, F. (2018) *Statistika Untuk Penelitian Pendidikan Dan Ilmu-Sosial*. Edited by M. Astuti. Jakarta: Prenadamedia Group.
- Juliansyah, E. *et al.* (2024) 'Risk Factors for Primary Hypertension', *Jurnal Kesehatan*, 15(2), pp. 193–198. Available at: <https://doi.org/10.26630/jk.v15i2.4188>.
- Julianto, J.D., Yuliana, N. and Mirasari, T. (2022) 'Pengaruh Rendam Kaki Air Hangat terhadap Penurunan Tekanan Darah Penderita Hipertensi pada Usia Pertengahan dan Lansia di Desa Genggong', 3(1), pp. 8–15.
- Kemenkes (2021) *Keputusan Menteri Kesehatan Republik Indonesia Nomor HK.01.07 Tahun 2021 Tentang Pedoman Nasional Pelayanan Kedokteran Tata Laksana Hipertensi Dewasa, Kementerian Kesehatan Republik Indonesia*. Indonesia: Menteri Kesehatan RI. Available at: https://kemkes.go.id/app_asset/file_content_download/1700108499655598d3c61e16.60954826.pdf.
- Kemenkes (2023) *Survei Kesehatan Indonesia (SKI)*, Kemenkes. Jakarta: Kemenkes BKPK.
- Kemenkes (2024) *Pedoman Pengendalian Hipertensi Di Fasilitas Kesehatan Tingkat Pertama*. Jakarta: Kementerian Kesehatan RI.
- Khalesi, S. *et al.* (2024) 'Barriers and Enablers to Salt Intake Reduction in Australian Adults With High Blood Pressure', *British Journal of Nutrition*, 132(6), pp. 815–822. Available at: <https://doi.org/10.1017/S0007114524002174>.
- Komariah, A. *et al.* (2025) 'Pengaruh Hydrotherapy dengan Campuran Garam terhadap Penurunan Tekanan Darah pada Pasien Hipertensi', *Jurnal Penelitian Perawat Profesional*, 7, pp. 53–60.
- Kristiningtyas, Y.W. (2023) 'Efektifitas Rendam Kaki Dengan Air Hangat Terhadap Penurunan Tekanan Darah Pada Lansia Hipertensi', *Jurnal Keperawatan GSH*, 12(2), pp. 26–33.
- Loke, K.B. (2022) 'Pengaruh Rendam Kaki Air Hangat Dengan Campuran Garam Terhadap Penurunan Tekanan Darah Pada Pasien Hipertensi Tingkat I Di Sendangmulyo', *Angewandte Chemie International Edition*, 6(11), 951–952., pp. 5–24.
- Malibel, Y.A.A., Herwanti, E. and Djogo, H.M.A. (2020) 'Pengaruh Pemberian Hidroterapi (Rendam



- Kaki Air Hangat) terhadap Penurunan Tekanan Darah pada Pasien Hipertensi di Wilayah Kerja Puskesmas Sikumana Kota Kupang', *CHMK Health Journal*, 4(1), pp. 124–131.
- Manuntung, A. (2018) *Terapi Perilaku Kognitif Pada Pasien Hipertensi*. Malang: Penerbit Wineka Media.
- Marlita, M., Lestari, R.M. and Ningsih, F. (2022) 'Hubungan Gaya Hidup (Lifestyle) dengan Kejadian Hipertensi pada Usia Produktif', *Jurnal Surya Medika*, 8(2), pp. 24–30. Available at: <https://doi.org/10.33084/jsm.v8i2.3850>.
- Mayangsari, E., Lestari, B. and Nurdiana (2019) *Farmakoterapi Kardiovaskuler*. Edited by H.D. Karunawati. Malang: Tim UB Press.
- Muliyadi, Putri, P. and Yuniarti, F. (2023) *Manajemen Hipertensi Pendekaran Transformasi*. Yogyakarta: Deepublish digital.
- Mulyana, A. et al. (2024) *Metode Penelitian Kuantitatif*. Edited by R. Oktavera and P.N. Fauziah. Makassar: CV. Tohar Media.
- Nilawati, I., Kasron and Sodikin (2023) 'Hubungan Jenis Kelamin, Pendidikan dan Lama Menderita Hipertensi dengan Kualitas Hidup Lansia Hipertensi di Puskesmas Cilacap Selatan II', *Jurnal Medika Usada*, 6, pp. 6–12.
- Nova, D. et al. (2023) *Pengantar Kesehatan Reproduksi Wanita*. Edited by S. Yusran and J. Saimin. Purbalingga: Eureka Media Aksara.
- Nurpratiwi and Novari, E. (2021) 'Pengaruh Rendam Kaki Dengan Air Hangat Terhadap Tekanan Darah Pada Penderita Hipertensi Di Wilayah SP 4 Setuntung Kecamatan Belitang Kabupaten Sekadau', *Inovasi Penelitian*, 2(1), p. 523. Available at: <https://doi.org/10.47492/jip.v2i2.712>.
- Nursanti, I. et al. (2025) *Asuhan Keperawatan Pasien dengan Hipertensi pada Periode Menopause*. Edited by N. Uly. Jakarta Barat: PT Nuansa Fajar Cemerlang Jakarta.
- Pakpahan, J.E.S. and Putra, A. (2022) 'Pengaruh Pemberian Rendam Kaki Air Hangat Campuran Garam Terhadap Penurunan Tekanan Darah Penderita Hipertensi Di Desa Alus-Alus Kecamatan Teupah Selatan Kabupaten Simeulue', *Jurnal Kebidanan, Keperawatan dan Kesehatan (J-BIKES)*, 2(1), pp. 41–44.
- Papeti, S.M., Kasim, Z. and Ismawati (2025) 'Pengaruh Terapi Rendam Kaki Air Hangat Terhadap Tekanan Darah Pada Penderita Hipertensi di Puskesmas Bailang Kota Manado', 1(1), pp. 126–132.
- Parawati, R. and Dumilah, H.D.R. (2016) *Khasiat Ajaib daun Avokad*. Cibubur: Penebar Swadaya.
- Potter, P.A. et al. (2020) *Dasar-Dasar Keperawatan Edisi 9*. 9th edn. Edited by E. Novieastari et al. Singapore: Elsevier.
- Pradono, J., Kusumawardani, N. and Rachmalina, R. (2020) *Hipertensi : Pembunuh Terselubung Di Indonesia, Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan RI*. Jakarta: Lembaga penerbit badan penelitian dan pengembangan kesehatan (LPB). Available at: <https://repository.kemkes.go.id/book/10>.
- Prihandono, E. (2021) 'Min-min Solution Sebagai Metode Konversi Skala Termometer', *Jurnal Pendidikan Fisika*, 9(2), p. 204. Available at: <https://doi.org/10.24127/jpf.v9i2.3736>.
- Putra, H.A. (2025) 'Hubungan Gaya Hidup dan Pola Makan dengan Kejadian Hipertensi di Desa Ngadirejo Temanggung Jawa Tengah 2025', *Agrotech : Jurnal Ilmiah Teknologi Pertanian*, 7(1), pp. 1–11. Available at: <https://doi.org/10.37631/agrotech.v7i1.1921>.
- Putra, R.A. and Hanggara, A. (2022) *Analisis Data Kuantitatif*. Edited by T. Lestari. Surabaya: CV. Jakad Media Publishing.



- Rachmawati, Y.A., Siswanti, H. and Rustono (2025) 'Pengaruh Rendam Kaki Dengan Air Hangat Terhadap Penurunan Tekanan Darah Pada Pasien Hipertensi Di Rumah Sakit Dr. Soetarto Yogyakarta', *Prosiding University Research Colloquium*, 20, pp. 899–908.
- Rehena, J.F. and Wael, S. (2023) *Buku Ajar Anatomi Fisiologi Manusia Untuk S1 Biologi*. Edited by Y. Abdulloh. Purwodadi: CV. Sarnu Untung.
- Rohmah, M., Wahyuningsih, T. and Kurtusi, A. (2023) 'Pengaruh Hydroterapi Rendam Kaki Air Hangat Dengan Campuran Garam Terhadap Perubahan Tekanan Darah Pada Pasien Hipertensi', *Jurnal Kesehatan Universitas Yatsi Madani*, 12(1), pp. 29–34. Available at: <https://doi.org/10.37048/kesehatan.v12i1.224>.
- Rohmawati, D.L. (2021) *Terapi Komplementer Untuk Menurunkan Tekanan Darah (Evidence Based Practice), Sustainability (Switzerland)*. Edited by R.R. Rerung. Bandung: Penerbit Media sains Indonesia. Available at: http://scioteca.caf.com/bitstream/handle/123456789/1091/RED2017-Eng-8ene.pdf?sequence=12&isAllowed=y%0Ahttp://dx.doi.org/10.1016/j.regsciurbeco.2008.06.005%0Ahttps://www.researchgate.net/publication/305320484_Sistem_Pembetulan_Terpusat_Strategi_Melestari.
- Safitri, S. (2020) *Buku Saku Waspadaai Hipertensi, Yuk Kenali Penanganannya!, Buku Saku Waspadaai Hipertensi*. Medan: PBL-DR FKM UINSU Kelompok 13.
- Sahir, S.H. (2021) *Metodologi Penelitian*. Edited by T. Koryati. Yogyakarta: KBM Indonesia Anggota IKAPI.
- Saimi (2024) *Cegah Hipertensi Kenali Pencetus Dan Temukan Solusi*. Edited by N. Duniawati. Indramayu: CV. Adanu Abimata.
- Saputra, K.F. et al. (2023) *Keperawatan Keluarga*. Edited by P. Pustaka. Sukoharjo: Penerbit Pradina Pustaka.
- Saragih, M., Aryanti, D. and Yuliza, E.I. (2022) *Asuhan Gizi dan Keperawatan pada Hipertensi*. Edited by Neptunus. Banyumas: Omera Pustaka.
- Sarfika, R. and Saifudin, I.M.M.Y. (2024) *Perawatan Diri Penderita Hipertensi Usia Dewasa Berbasis Teori dan Riset*. Edited by E.R. Fadilah. Yogyakarta: Penerbit Deepublish Digital.
- Selfianie, M., Suharsono and Pujiastuti, S.E. (2025) *Resistance Band Exercise, Sebagai Intervensi Penurunan Tekanan Darah pada Penderita Hipertensi*. Edited by A.F. Rohman. Banjarnegara: PT. Penerbit Qriset Indonesia.
- Siregar, S. (2017) *Metode Pemilihan Kuantitatif: Dilengkapi Dengan Perbandingan Perhitungan Manual & SPSS*. Jakarta: Kencana (Divisi dari Prenadamedia Group).
- Soenardi, T. (2017) *Menu Pencegah & Atasi Stroke*. Edited by I. Hardiman and Y. Asmoro. Jakarta: PT. Gramedia.
- Sudarta, I.M., Hasir and Oktaviani, D. (2024) 'Penerapan Terapi Rendam Kaki Menggunakan Air Hangat (Hidrotherapy) Terhadap Penurunan Tekanan Darah Pada Lansia', 1(1), pp. 8–13. Available at: <http://jurnal.poltekkesmamuju.ac.id/index.php/m>.
- Sugiyono (2017) *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta.
- Sugiyono (2022) *Metode Penelitian Kuantitatif*. Edited by Setiyawami. Bandung: Alfabeta.
- Suhadi, R. et al. (2016) *Seluk Beluk Hipertensi: Peningkatan Kompetensi Klinis Untuk Pelayanan Kefarmasian*. Edited by I.P. Baryadi. Yogyakarta: Sanata Dharma University Press.
- Sulistiyo, U. (2019) *Buku Ajar Metode Penelitian Kualitatif*. Edited by M. Rinaldy. Jambi: Salim Meedia Indonesia. Available at:



- https://www.google.co.id/books/edition/Buku_Ajar_Metode_Penelitian_Kualitatif/b_T-EAAAQBAJ?hl=id&gbpv=1&dq=buku+triangulasi&printsec=frontcover.
- Sumantri, A. (2015) *Metodologi Penelitian Kesehatan*. Edited by Murodi and F. Ekayanti. Jakarta: Kencana Prenadamedia Group.
- Suryani, L. et al. (2023) *Buku Ajar Ilmu Biomedik Dasar*. Edited by P.I. Daryaswanti. Jambi: PT. Sonpedia Publishing Indonesia.
- Susanti, E. and Damayanti, N.N.C. (2022) 'Pengaruh Hidroterapi Rendam Kaki Air Hangat terhadap Tekanan Darah pada Lansia Penderita Hipertensi di Palembang', *Jurnal Media Keperawatan Politeknik Kesehatan Makassar*, 13(2), pp. 185–191.
- Syapitri, H., Amila and Aritonang, J. (2021) *Buku Ajar Metodologi Penelitian Kesehatan*. Edited by A.H. Nadana. Magelang: Ahlimedia Press.
- Tambunan, F.F. et al. (2021) *Buku Saku Hipertensi Si Pembunuh Senyap 'Yuk Kenali Pencegahan dan Penanganannya.'*, *Buku Saku*. Edited by R.A. Harahap. Medan: CV. Pusdikra Mitra Jaya.
- Terimajaya, I.W. et al. (2024) 'Dasar-Dasar Statistika (Konsep Dan Metode Analisis)'. Edited by Sepriano and Efitra. Jambi: PT. Sonpedia Publishing Indonesia, p. 28.
- Theresia, T.T. et al. (2025) *Identifikasi dan Modifikasi Faktor Risiko Karies dan Penyakit Periodontal*. Ponorogo: Uwais Inspirasi Indonesia.
- Tomayahu, Y., Febriyona, R. and Sudirman, A.N.A. (2023) 'Pengaruh Rendaman Kaki Air Hangat Dengan Campuran Garam Terhadap Penurunan Tekanan Darah Pada Penderitahipertensi Di Desa Dunggala, Kecamatan Batudaa', *Jurnal Rumpun Ilmu Kesehatan*, 3(1), pp. 38–48. Available at: <https://doi.org/10.55606/jrik.v3i1.1221>.
- Tresna A., A.A., Mulyani, N. and Irianti, B. (2023) 'The Effect Of Epsom Salt and Lemongrass Foot Soaks On The Alteration Of Blood Pressure In Hypertensive Pregnant Mothers In The Public Health Center Of Cigalontang 2021', *Media Informasi*, 19(1), pp. 38–45. Available at: <https://doi.org/10.37160/bmi.v19i1.144>.
- Tsang, J.N.J. et al. (2023) 'Systolic Blood Pressure Levels and Mortality in Australian Medical Inpatients', *Journal of Clinical Hypertension*, 25(11), pp. 1036–1039. Available at: <https://doi.org/10.1111/jch.14735>.
- Tsang, J.N.J., Woodman, R. and Mangoni, A.A. (2025) 'Prevalence of Inpatient Blood Pressure Elevations in Australian Hospitalised Patients and Analysis of Associated Factors', *Internal Medicine Journal*, pp. 1–7. Available at: <https://doi.org/10.1111/imj.70145>.
- Tumurang, M. (2024) *Metodologi Penelitian*. Edited by L.O. Alifariki. Cilacap: PT media Pustaka Indo.
- Udani, G., Yulyuswarni and Lendawati (2022) 'Pengaruh Hidroterapi Rendam Kaki Air Hangat Garam Magnesium terhadap Kadar Magnesium Darah dan Tekanan Darah Lansia dengan Hipertensi', *Jurnal Kesehatan Metro Sai Wawai*, 15(1), pp. 12–20. Available at: <https://doi.org/10.26630/jkmsaw.v15i1.3280>.
- UINSU, P.D.K. 19 (2020) *Buku Saku Pedoman Pencegahan Penyakit Hipertensi, Pedoman Pencegahan Penyakit Hipertensi*. Edited by R.A. Harahap. Medan: CV. Kencana Emas Sejahtera. Available at: https://www-who-int.translate.goog/news-room/fact-sheets/detail/hypertension?_x_tr_sl=en&_x_tr_tl=id&_x_tr_hl=id&_x_tr_pto=tc.
- Uliya, I. and Ambarwati (2020) 'Terapi Rendam Kaki Menggunakan Air Hangat Dengan Campuran Garam Dan Serai Untuk Menurunkan Tekanan Darah Pada Penderita Hipertensi', *Jurnal Profesi Keperawatan Academi Keperawatan Krida Husada Kudus*, 7(2), pp. 88–102.
- Undang-undang (2003) *Undang-Undang Republik Indonesia Nomor 20 tahun 2003 tentang Sistem*





- Pendidikan Nasional*. Indonesia. Available at: <https://luk.staff.ugm.ac.id/atur/UU20-2003Sisdiknas.pdf>.
- Undang-undang (2017) *Peraturan Mahkamah Agung Nomor 3 Tahun 2017 Tentang Pedoman Mengadili Perkara Perempuan Berhadapan Dengan Hukum*. Indonesia. Available at: <http://urj.uin-malang.ac.id/index.php/jfs/article/view/488%0A>.
- Viana, A.O. and Sari, I.M. (2022) 'Pengaruh Rendam Kaki Air Hangat Terhadap Tekanan Darah pada Lansia Hipertensi', 1(4), pp. 702–709. Available at: <https://doi.org/10.55123/sehatmas.v1i4.984>.
- Wawan, A. and Dewi, M. (2014) *Teori dan Pengukuran Pengetahuan Sikap dan Perilaku Manusia*. Edited by J. Budi. Yogyakarta: Nuha Medika.
- WHO (2023) *Global Report On Hypertension The Race Against A Silent Killer*. Geneva: World Health Organization.
- Widyastuti, T. and R. et al. (2024) *Metodologi Penelitian (Panduan Lengkap Penulisan Karya Ilmiah)*. Edited by Efitra and Sepriano. Jambi: PT. Sonpedia Publishing Indonesia.
- Widyaswara, C.D., Hardjanti CB, T.M. and Mahayanti, A. (2022) 'Pengaruh Hidroterapi Rendam Kaki Air Hangat terhadap Penurunan Tekanan Darah pada Lansia Hipertensi di Dusun Kembangan, Candibinangun, Pakem, Sleman, Yogyakarta', *Jurnal Keperawatan Klinis dan Komunitas (Clinical and Community Nursing Journal)*, 6(3), p. 145. Available at: <https://doi.org/10.22146/jkkk.75264>.
- Wulandari, D.Y. et al. (2025) 'Faktor-Faktor yang Berhubungan dengan Kejadian Hipertensi pada Pasien Usia Dewasa di Puskesmas Karawaci Baru', *Jurnal Ilmu Kesehatan*, 14(2), pp. 29–36.

