THE USE OF SOAKING WARM WATER FOR BLOOD PRESSURE REDUCTION IN ELDERLY HYPERTENSIVE PATIENTS

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Abstract

Introduction: *According to a survey conducted by the Indonesian Gerontology Doctor Association in 2022, 37.8% of the elderly population in Indonesia have a history of hypertension. In addition to medication therapy, hypertension can be controlled through non-pharmacological therapy, including soaking the feet in warm water. The purpose of this study is to investigate the use of soaking the feet in warm water to reduce blood pressure in elderly hypertensive patients in Jatikalang, Prambon District.*
Method: *This pre-experimental study uses a one-group pre-test and post-test strategy. The population for this study consists of 46 elderly hypertensive patients. The technique of sampling is purposive, resulting in a sample size of 42 elderly patients. The instruments used are a questionnaire and an observation sheet. Data analysis was done by the Wilcoxon test.*
Results: *The systolic blood pressure before soaking the feet in warm water was 140.98 mmHg, and the diastolic blood pressure was 83.29 mmHg. The results of the analytical test yielded 0.000 (a p-value) for systolic blood pressure, and 0.000 for blood pressure of diastolic.*
Conclusions: *Soaking the feet in warm water reduces the blood pressure of elderly hypertensive patients. It is hoped that this therapy can be used as an additional treatment for hypertension patients, allowing the community to perform it at home for 15 minutes daily, to lower blood pressure at a low cost.*

Keywords: *Soaking Feet in Warm Water, Blood Pressure, Elderly*

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INTRODUCTION

The increase in the number of hypertension patients has become a concern recently, especially among the elderly in rural areas. Rural people generally have less health education and information compared to urban. To raise awareness as promotive and preventive efforts are needed among the public about early detection through regular blood pressure measurements and consistent medication compliance. Hypertension is also a threat to public health as it leads to complications (stroke, kidney failure, and coronary heart) disease (Kementrian Kesehatan Republik Indonesia, 2019b).

A survey conducted by the Indonesian Gerontology Doctor Association (PERGEMI) in 2022 found that 24.6% of the elderly population in Indonesia have a history of chronic diseases. Among them, 37.8% suffer from hypertension, 22.9% suffer from diabetes, 11.9% suffer from joint diseases, 11.4% suffer from heart disease, 10.4% suffer from asthma, 8% suffer from stomach diseases, 5.5% suffer from gout, 3% suffer from chronic lung diseases, 3% suffer from high cholesterol, and 2% suffer from kidney diseases (Dihni, 2022).

Factors that can affect blood pressure are modifiable and non-modifiable. Non-modifiable aspects are gender, genetics, and age, while modifiable factors are diet, obesity, stress, consumption of alcohol, less physical activity, and smoking Kurnia (2020).

Hypertension management consists of two categories: pharmacological, and non-pharmacological therapy. Pharmacological therapy with antihypertensive doses is commonly prescribed for hypertension patients, but it may have side effects such as headaches, dizziness, weakness, and nausea. Non-pharmacological treatment of hypertension can be achieved through alternative complementary therapies, such as hydrotherapy. Blood pressure can be reduced by regular hydrotherapy. Types of hydrotherapy include soaking the feet in warm water, taking a warm bath, and applying warm compresses (Sinurat, Ningsih, and Syapitri, 2020). In rural areas, many people are still unaware of non-pharmacological treatments, such as lowering blood pressure by soaking feet in warm water in addition to taking medication.

According to data from the World Health Organization (WHO) (2015), about 1.13 billion hypertension of people worldwide, which is 1 out of 3 people. The number of hypertension patients continues to increase every year, becoming approximately 1.5 billion (people with hypertension in 2025), and 10.44 million hypertension people and its complications probably will die every year (Kementrian Kesehatan Republik Indonesia, 2019a).

The Basic Health Research or *Riskesdas* of 2018 reported the hypertension prevalence (aged 18 years) was 34.1%, the highest was 44.1% (in South Kalimantan), and the lowest was 22.2% in Papua. The total of hypertension patients in Indonesia is estimated to be 63,309,620, while the number of deaths (due to hypertension) is 427,218. Hypertension of 31-44 years is 31.6%, 45.3% in the age group 45-54, and 55.2% in the age group 55-64. The dominance of hypertension is 34.1%, 13.3% of the population was diagnosed with hypertension and never took medication, and 32.3% of the population used medication irregularly (Kemenkes RI, 2019).

In Table 1, the prevalence of hypertension in the East Java Province from 2013 to 2018 has continued to increase

Table 1 Prevalence of hypertension according to Basic Health Research (Riskesdas) in East Java 2013-2018

Year	Prevalence of hypertension
2013	26,4%
2015	15,16%
2016	13,47%
2017	20,43%
2018	36,3%

significantly. The 2018 Basic Health Research estimated that the number of hypertension patients aged 15 and above in East Java reached 11,008,334, 48.83% were male and 51.17% were female. Approximately 35.50%, or around 3,919,484, of hypertension patients, received medical treatment (Dinas Kesehatan Provinsi Jawa Timur., 2020).

The Sidoarjo City Health Department estimated that the number of hypertension patients starting from the age of 15 in 2020 was 562,203 people, with a nearly equal balance between males and females (Dinas Kesehatan Kabupaten Sidoarjo, 2021).

The proportion of elderly individuals with hypertension recorded from January to September 2022 in Prambon was 1,458. In the Jatikalang village, the number of elderly individuals with high blood pressure in 2022 was 230. The initial results of data collection on elderly patients with hypertension at the Puskesmas Prambon from June to August 2022 found 46 elderly patients with high blood pressure.

According to previous studies, there are several challenges and problems related to blood pressure reduction in the elderly population, such as: First, age-related changes in the cardiovascular system (Webb and Inscho, 2007): As they age, their blood vessels become less elastic, which can make it difficult to lower blood pressure. Second, comorbidities: Many elderly people have other health conditions that can make blood pressure control difficult, such as diabetes and kidney disease (Alsuwaidan *et al.*, 2021). Third, medication side effects: Elderly people are more likely to experience side effects from blood pressure medications, which can make finding an effective treatment difficult (Lee, Jeon,g and Lee, 2022). Fourth, poor adherence to treatment: Many older adults have difficulty following complex treatment regimens, which can make it difficult to achieve and maintain blood pressure control (Smaje *et al.*, 2018). Fifth, social isolation and depression: This is common among the elderly and can also affect their health and make hypertension control difficult (World Health Organization, 2021). Sixth, treatment costs: Some elderly people may not be able to afford the costs of blood pressure treatment, which can make it difficult for them to get the treatment they need (Sheppard *et al.*, 2020). Seventh, limited access to care: Some elderly people may have difficulty going to the doctor or clinic for routine checkups and treatment adjustments, which can make managing their blood pressure difficult (Leyva, Taber and Trivedi, 2020). Eighth, cognitive impairment: Some elderly people may have difficulty understanding and following instructions for taking medication or making lifestyle changes, which can make blood pressure control difficult (Campbell *et al.*, 2012). The above eight issues are very commonly experienced by hypertensive patients in rural areas. Therefore, it is necessary to apply alternative techniques for reducing hypertension that are cheap, affordable, and

self-sufficient. One non-pharmacological approach to lower blood pressure is soaking feet in warm water. This technique is thought to have a vasodilatory effect, which can help reduce blood pressure. This research is to examine the effect of soaking feet in warm water on blood pressure reduction to determine whether this method is a viable option for hypertension management.

Based on the background above, the author intends to research reducing blood pressure by the use of soaking feet in warm water for elderly hypertension patients in Jatikalang, Prambon District.

METHODS

Study Design

This research uses a quantitative method. The design chosen by the researcher is a one-group pretest-posttest design.

Population, Samples, and Sampling

This research is conducted from December 1st to 15th, 2022. The subjects of this research are elderly hypertension patients in Jatikalang Village, Prambon District, consisting of 46 elderly individuals. The technique of sampling is purposive, therefore, the sample size in this research is 42 elderly individuals. The variables in this research are soaking the feet in warm water (as the independent variable) and blood pressure (as the dependent variable).

Inclusion of Criteria

Individuals who are willing to be research respondents, subjects are men or women who have been diagnosed with hypertension by a doctor or health officer, with systolic blood pressure of ≥ 140 mmHg, or diastolic blood pressure of ≥ 90 mmHg, respondent age ≥ 60 years, the respondent's feet have no open or bleeding wounds.

Exclusion of Criteria

Other supplementary therapies such as drinking avocado leaf decoction, sirih leaf water decoction, acupuncture, acupressure, laughter therapy, foot massage, yoga, meditation, and deep breathing techniques, other comorbidities such as diabetes, stroke, kidney failure, critical hypertension (of systolic blood pressure 180 mmHg), and diastolic blood pressure (of 110 mmHg) due to risk factors for organ damage, and can only be treated with drugs or pharmacology in addition to a healthy lifestyle, and alcohol consumption.

Instruments

The instruments of this research consist of observation sheets and questionnaires, while the tools are a digital sphygmomanometer, water thermometer, bucket, and stopwatch.

Procedure

The research is conducted for 2 weeks with 4 meetings with the respondents. Before intervening (by soaking feet in warm water), the patient is first rested for 10 minutes and then their blood pressure is measured and recorded on the observation sheet. Prepare warm water by measuring the water temperature at 40°C with a water thermometer. Wash the patient's feet if they appear dirty. Soak the patient's feet in warm water for 15 minutes, to measure the soaking time use a stopwatch for each patient. Cover the bucket with a towel to maintain the temperature. The water temperature is measured again every 5 minutes, when the temperature drops then add hot water up to the temperature returns to 40°C. Blood pressure is measured and recorded again on the observation sheet.

Table 2 Demographic Characteristics of Age, Gender, Education, and Health History of Hypertensive Elderly Patients in Jatikalang Village, Prambon Subdistrict, December (n=42)

Characteristics	n	%
Years		
60-65 years	26	61.9
66-70 years	16	38.1
Gender		
Female	25	59.5
Male	17	40.5
Education		
Elementary	36	85,7
Junior High	4	9.5
Senior High	1	2.4
Higher Education	1	2.4
Health History		
a. Family History		
Yes, hypertension	37	88.1
No hypertension	5	11.9
b. Smoking History		
Smoking	9	21.4
Not smoking	28	66.7
Smoking History	5	11.9
c. Low Salt Diet		
Yes, doing	3	7.1
No, not doing	39	92.9
d. Compliance with Medication Consumption		
Compliant	9	21.4
Sometimes	23	54.8
Not compliant	10	23.8
e. Physical Activity		
Yes, doing	37	88.1
No, not doing	5	11.9

Data Analysis

Univariate analysis

Univariate analysis of this warm foot bath includes factors such as age, gender, family history of hypertension, smoking, low salt diet, physical activity, consumption of antihypertensive drugs, and blood pressure. Numerical data is analyzed using the mean, and variation is measured using the range, resulting in a 95% confidence interval (CI). Categorical data is analyzed using percentages or proportional frequency distributions.

Bivariate analysis

Data presentation is directed to determine the connection between dependent and independent variables using the Wilcoxon Sign Rank test (in SPSS version 22) with a P-value of ($\alpha < 0.05$).

Ethical Clearance

The ethics code was implemented at the Faculty of Health at Muhammadiyah University of Gresik with number 165/KET/II.3.UMG/KEP/A/2022.

RESULTS

According to Table 2, the results show that out of 42 elderly hypertension patients, the majority are aged 60-65 years old, with 26 (61.9%), being female, 25 (59.5%), have a primary school education, with 36 (85.7%), have a family history of hypertension, with (88.1%), do not smoke, with (66.7%), do not have a low salt diet, with (92.9%), do not regularly consume medication, with (54.8%), and engage in physical activity, with (88.1%).

According to Table 3, the results of the average systolic blood pressure of elderly hypertensive patients before the therapy of warm foot bath is 156.51 mmHg, while the average diastolic blood pressure is 93.42 mmHg.

According to Table 4, it is found that the average of systolic blood pressure for elderly hypertensive patients after the therapy of warm foot bath is 140.98 mmHg, while the average diastolic blood pressure is 83.29 mmHg.

Table 5 shows that the hypertensive average blood pressure for elderly patients, before receiving warm foot soak therapy, was 156.51 mmHg (for systolic pressure), and 93.42 mmHg (for diastolic pressure). After receiving warm foot soak therapy, the average of systolic pressure was 140.98 mmHg, and the average of diastolic pressure was 83.29 mmHg. The different average blood pressure before and after soaking was 15.53 mmHg (for systolic pressure), and 10.13 mmHg (for diastolic pressure). Wilcoxon statistical test shows a value of $p=0.000$, which is less than ($\alpha=0.05$), and it can be concluded that warm foot soak therapy affects reducing blood pressure in hypertension of elderly patients in Jatikalang, Prambon District.

DISCUSSION

Before Intervention of Warm Foot Soak: Blood Pressure in Hypertensive Elderly in Jatikalang, Prambon District

Table 3 found that the average blood pressure in hypertensive elderly before receiving warm foot soak therapy was 156.51 mmHg (for systolic pressure), and 93.42 mmHg (for diastolic pressure).

Hypertension is a blood pressure of systolic and diastolic above 140/90 mmHg. Blood pressure is affected by heart rate, peripheral blood vessel resistance, and circulating blood volume (Hasnawati, 2021).

Hypertension in the elderly occurs under the influence of many risk factors, such as diet, physical movement, smoking, excessive salt intake, obesity, alcohol consumption, and stress, as well as those that cannot be modified, such as age, gender, and family history Kurnia (2020).

Blood pressure in the elderly is influenced by several factors, with age being the first. In this study, the majority of hypertensive elderly individuals were aged between 60-65 years, with a total of 26 individuals (61.9%). This is similar to a study by Hidayah et al., (2022), which found that individuals above 46 had 5.5 times higher risks of hypertension compared to individuals under 45 years. Additionally, according to Chaidir et al., (2022), hypertension prevalence increases by 50-60% as age increases. This research supports previous findings and theories, as the results indicate a correlation between age and hypertension incidence, with an increased risk of high blood pressure as age increases.

The second factor is gender. In this research, the majority of the elderly

Table 3 Blood Pressure Before Intervening with Warm Foot Soaking in Elderly Hypertensive Patients in Jatikalang Village, Prambon District, December 2022 (n=42)

Characteristics	n	Mean
Blood pressure of Systolic Pre	42	156,51
Blood pressure of Diastolic Pre	42	93,42

Table 4 Blood Pressure After Intervention of Warm Foot Bath on Elderly Hypertensive Patients in Jatikalang Village, Prambon District, December 2022 (n=42)

Characteristics	n	Mean
Blood Pressure Systolic Post	42	140,98
Blood Pressure Diastolic Post	42	83,29

Table 5 Blood Pressure After Intervention of Warm Foot Bath on Elderly Hypertensive Patients in Jatikalang Village, Prambon District, December 2022 (n=42)

Variable	Before	After	Mean	P Value
	Pre	Post	Gap	
Blood Pressure Systolic	156,51	140,98	15,53	0,000

population is female, numbering 25 individuals (59.5%). The prevalence of hypertension in women is similar to results by Pebrisiana et al., 2022) found that 10 (37%) men had hypertension and 66 (91.7%) women were diagnosed with hypertension. According to research conducted by Elvira & Anggraini, (2019), women who have gone through menopause are inclined to possess elevated blood pressure due to the low levels of estrogen in their blood, which can cause the arteries to harden and increase the hypertension risk. This research indicates no differences between theory and previous research, that women are more sensitive to hypertension, due to the increased risk of hypertension during menopause resulting from hormonal imbalances. The conclusion of this research shows that a correlation exists between females and increasing blood pressure**.**

The third factor is a low-salt diet. In this research, almost all hypertensive elderly patients did not adhere to a low-salt diet; as many as 39 people (92.9%) were non-compliant. This research is consistent with Kurnia (2020) findings, that changes in eating patterns can be achieved by modifying healthy eating habits. High hypertension incidence often occurs in patients who consume excessive amounts of fatty and salty foods. This is also similar to Chaidir et al., (2022) that found a significant correlation between compliance with a low-salt diet and hypertension incidence (with a p-value of 0.000). Based on the findings and theories, the researcher believes that some of the elderly do not adhere to a low-salt diet due to several factors, one of which is a lack of understanding of hypertension (signs and symptoms, complications, and management).

This study indicates a strong correlation between a family history of hypertension and the incidence of hypertension in the elderly population of Jatikalang Village, Prambon District. The study found that 88.1% (37 out of 42) of the elderly participants had hypertension or a family history. This agrees that genetic factors perform a significant role in the development of hypertension Kurnia

(2020). Studies by Widiharti et al., (2020) and Adam et al., (2018) also found a significant connection between family history and hypertension prevalence. The results of this study support the idea that hypertension individuals with a family history are at a higher risk.

Elderly individuals with hypertension in Jatikalang Village, Prambon District often experience complaints such as headaches, blurry vision, back pain, agitation, and tension. However, immersing the feet in warm water can improve comfort and promote vasodilation, which in turn leads to a reduction of blood pressure.

After Intervention of Warm Water Foot Immersion: Blood Pressure on Elderly Hypertensive Patients in Jatikalang, Prambon District

According to Table 4, it is found that the average of blood pressure for elderly hypertensive patients after being given warm water foot immersion therapy is 140.98 mmHg, and the blood pressure diastolic is 83.29 mmHg.

This indicates a decrease in blood pressure of the elderly with hypertension. The results align with the theory of Novari (2021) that water therapy has a relaxing effect on the body, which can then stimulate the release of endorphins in the body and inhibit adrenaline. This can lower blood pressure by decreasing heart rate, dilating blood vessels, and reducing stress levels. Additionally, it can stimulate the production of endorphins which have the property of relieving pain.

According to research by Arifin & Mustofa (2021), warm water foot immersion therapy has several benefits, including treating fever, reducing pain, reducing fatigue, increasing body immunity, and providing maximum cardiovascular support. It also helps in treating swelling, relaxing muscles, and relieving muscle pain.

The results of this research align with those of a study by Suwandewi & Rizani (2022) which found that the average blood pressure of systolic before immersion therapy of warm water foot was 149.67 mmHg, and the average diastolic blood pressure before therapy was 93.33 mmHg. After immersing the feet in warm water, the systolic blood pressure decreased to 143.33 mmHg, and the blood pressure of diastolic decreased to 88.33 mmHg.

This research agrees with Arafah (2019) on the application therapy of warm water foot soak. The study was conducted on all hypertensive respondents, and it showed a change in blood pressure, before and after therapy for 3 days. The results ranged from 160/100 to 130/90 mmHg, and from 170/90 to 130/90 mmHg. Based on these two cases, the blood pressure average of systolic decreased by 7.21 mmHg, and the blood pressure of diastolic decreased by 1.1 mmHg.

According to blood pressure measurements after interventions on elderly with hypertension, 34 elderly people encountered reduced blood pressure, and 8 did not have a lessening blood pressure. Difficulty Factors of the elderly in decreasing blood pressure include not following a low-salt diet, not regularly taking antihypertensive medication, having a hypertension family history, and also the individual experiencing different body reactions to warm water.

The therapy of soaking warm water feet can lower blood pressure due to the biological effects of warmth, which can dilate blood vessels, thus increasing blood flow and also causing the body to relax. Warm or hot water can promote the increase of heart rate and dilation of blood

vessels.

The Effect of Soaking Foot of Warm Water for Decreasing Blood Pressure of Elderly Hypertensive Patients in Jatikalang, Prambon District

According to Table 5, before the therapy of warm water foot soaking, the average blood pressure for elderly hypertension patients was 156.51 mmHg for systolic and 93.42 mmHg for diastolic. After warm water foot immersion therapy, the average blood pressure was 140.98 mmHg (for systolic), and 83.29 mmHg (for diastolic). Before and after soaking therapy of warm water foot, the average difference in blood pressure was 15.53 mmHg (for systolic), and 10.13 mmHg (for diastolic). The statistical test of Wilcoxon showed 0.000 (p-value), less than (α 0.05). This means the therapy of warm water foot soaking affects increasing blood pressure for elderly hypertension patients in Jatikalang, Prambon District.

The principle of warm water foot immersion therapy is to deliver heat or warmth from hot water into the body, dilating blood vessels and relieving muscle tension to improve blood circulation. This affects blood pressure through receptors in the sinus, cerebral cortex, and aorta, sending impulses to all parts of the body and displaying blood pressure in the brain Sinurat et al., (2020)

The biological effects of heat or warmth, covering the hydrostatic pressure of the water, can dilate blood vessels, resulting in increased blood flow (from the feet to the chest cavity), and blood accumulation in the large heart arteries. Hot water will push the blood vessels to dilate and increase heart rate Rayuningtyas *et al.*, (2019).

The therapy benefits of using warm water for the feet include the physical warmth that enhances blood circulation and chemical reactions and metabolic processes in the tissues. The body's response to heat, physiologically, can increase tissue metabolism, dilate blood vessels, decrease muscle tension, decrease blood viscosity, and enhance capillary permeability Sinurat et al., (2020).

This is consistent with findings by Chaidir et al., (2022) and Farmana et al., (2020), which found that immersing feet in warm water once a day 3 times and 5 times for 15 minutes respectively, can provide a significant decrease in blood pressure for hypertension patients. Previous studies also showed the effects of soaking the feet using warm water (for 20 minutes) significantly decreased blood pressure systolic and diastolic in hypertensive individuals (Wantiyah, Husada, and Susumaningrum, 2019). Others found that soaking the feet for 15 minutes (in warm water) significantly decreased blood pressure of systolic and diastolic in individuals with hypertension (Hartinah *et al.*, 2019), and significantly decreased blood pressure of systolic and diastolic in hypertensive older adults (Sudiartawan, Putu and Adnyana, 2022).

Therefore, this study supports previous research that immersing feet in warm water is an effective therapy for lowering high blood pressure. This is demonstrated by the decreased complaints of nervousness, fatigue, dizziness, and headaches among the elderly after the intervention. Furthermore, during the 4 interventions of immersing feet in warm water, there was a blood pressure decrease in systolic and diastolic, which supports the notion that warm water is effective in increasing muscle flexibility, reducing pain, and dilating blood vessels, making it a simple, cheap and easy to do therapy that

can be done at home.

Based on observations (during the study), the blood pressure decrease can also be caused by environmental and psychological factors. Environmental factors include a calm and comfortable research location, while psychological factors include the respondent's comfort when immersing their feet in warm water and good communication with each other. However, blood pressure increases due to the respondent not being comfortable or having many thoughts and concerns. The researcher speculates that the intervention of immersing feet in warm water has a significant effect on reducing blood pressure.

It is difficult to verify the weaknesses of a specific research finding without additional information about the study design, sample size, and control group. However, some potential weaknesses of this study are the lack of a control group, a small sample size, or less generalizability to other populations. Additionally, it would be beneficial to know if the participants were on blood pressure medication and if the study was done over a long period to see if the results are consistent over time. Without more information, it is hard to assess the strength of the research.

CONCLUSIONS

The blood pressure average of systolic before soaking feet in warm water was 156.51 mmHg, and the blood pressure of diastolic was 93.42 mmHg. After the intervention of soaking feet in warm water, the blood pressure average of systolic decreased to 140.98 mmHg, and the blood pressure of diastolic to 83.29 mmHg (p-value 0.000, $\alpha < 0.05$).

Soaking feet in warm water can lower blood pressure, but it is not a substitute for medical treatment of hypertension. It may provide temporary relief, but it will not address the underlying cause of high blood pressure. Additionally, people with certain medical conditions, such as diabetes or peripheral artery disease, should avoid soaking their feet in warm water. These conditions can cause poor circulation and make the skin on the feet more vulnerable to infection. It's always best to consult with a medical professional before attempting to use this or any other method to lower your blood pressure, as there may be other underlying medical conditions that could be affected by this or could prevent this method from being effective.

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CONFLICT OF INTEREST

The Authors declare that during the process of completing this study, it does not have any conflicts of interest.

REFERENCES

Adam, A. G. A., Jeini, E. N. and Windy, M. V. W. (2018) 'Kejadian Hipertensi dan Riwayat Keluarga Menderita Hipertensi di Puskesmas Paceda Kota Bitung', *Jurnal KESMAS*, 7(5), pp. 1–5.

Alsuwaidan, S. *et al.* (2021) 'Prevalence of Comorbidity Among Elderly', *Global Journal of Ageing and Geriatric Research*, 1(4), pp. 1–3.

Arafah, S. (2019) 'Pengaruh Rendam Kaki Dengan Menggunakan Air Hangat Terhadap Penurunan Tekanan Darah Pada Hipertensi Di Wilayah Kerja Puskesmas Pattallassang Kab.

Takalar', *Jurnal Media Keperawatan: Politeknik Kesehatan Makassar*, 10(2), pp. 85–91.

Arifin, N. and Mustofa, A. (2021) 'Penerapan rendam kaki air hangat untuk menurunkan tekanan darah pada lansia hipertensi', *Ners Muda*, 2(3), p. 106. doi: 10.26714/nm.v2i3.8133.

Campbell, N. L. *et al.* (2012) 'Medication adherence in older adults with cognitive impairment: A systematic evidence-based review', *American Journal of Geriatric Pharmacotherapy*, 10(3), pp. 165–177. doi: 10.1016/j.amjopharm.2012.04.004.

Chaidir, R., Putri, A. and Yantri, K. (2022) 'Pengaruh Terapi Rendam Kaki Air Hangat Terhadap Tekanan Darah Pada Penderita Hipertensi', IX(1), pp. 37–44.

Dihni, V. A. (2022) 'Ini Penyakit Kronis yang Banyak Diderita Lansia Indonesia', p. 2022.

Dinas Kesehatan Kabupaten Sidoarjo (2021) 'Profil Kesehatan Tahun 2020 Kabupaten Sidoarjo', pp. 10–27.

Dinas Kesehatan Provinsi Jawa Timur. (2020) 'Profil Kesehatan Provinsi Jawa Timur 2020', *Dinas Kesehatan Provinsi Jawa Timur.*, p. tabel 53.

Elvira, M. and Anggraini, N. (2019) 'Faktor-Faktor Yang Berhubungan Dengan Hipertensi', *Jurnal Akademika Baiturrahim*, 8(1), pp. 79–89.

Farmana, T. P., Siringoringo, E. and Safruddin (2020) 'Rendam Kaki Dengan Air Hangat Terhadap Tekanan Darah Pada Pasien Hipertensi', *Jurnal Kesehatan Panrita Husada*, 5(1), pp. 9–17. doi: 10.37362/jkph.v5i1.174.

Hartinah, D. *et al.* (2019) 'The Effect of Hydrotherapy on Blood Pressure of The Hypertensive Patients in Public Hospital of RA. Kartini Jepara', 15(IcoSIHSN), pp. 96–99. doi: 10.2991/icosihsn-19.2019.22.

Hasnawati (2021) *Hipertensi*. Yogyakarta: Penerbit KBM Indonesia.

Hidayah, N. A. *et al.* (2022) 'Kejadian Hipertensi Di Wilayah Puskesmas Sumbang Ii Kabupaten Banyumas', *Jurnal Bina Cipta Husada*, XVIII(1), pp. 43–55.

Kemenkes RI (2019) 'Hipertensi Si Pembunuh Senyap', *Kementrian Kesehatan RI*, pp. 1–5.

Kementrian Kesehatan Republik Indonesia (2019a) *Hari Hipertensi Dunia 2019 : "Know Your Number, Kendalikan Tekanan Darahmu dengan CERDIK."*., *Kemenkes*.

Kementrian Kesehatan Republik Indonesia (2019b) *Hipertensi Penyakit Yang Paling Banyak Diidap Masyarakat*, *Kemenkes*.

Kurnia, A. (2020) *Self-Management Hipertensi*. Surabaya: CV. Jagad Media Publishing.

Lee, Sunmin, Jeong, K. and Lee, Seoyoon (2022) 'A Study on Types of Medication Adherence in Hypertension among Older Patients and Influencing Factors'.

Leyva, B., Taber, J. M. and Trivedi, A. N. (2020) 'Medical Care Avoidance Among Older Adults', *Journal of Applied Gerontology*, 39(1), pp. 74–85. doi: 10.1177/0733464817747415.

Novari, N. & E. (2021) 'The Effect Of Heat Water Foot Therapy On Reduction Of Blood Pressure On Hypertension At Pattallassang Public Health Centre Takalar', 1(2), pp. 36–40.

Pebrisiana, Tambunan, L. N. and Baringbing, E. P. (2022) 'The Relationship Of Characteristics With The Event Of Hypertension In Outpatient Patients In RSUD dr. Doris Sylvanus Central Kalimantan Province', *Jurnal Surya Medika*, Vol 8 No 3, pp. 176–186.

Rayuningtyas, W. *et al.* (2019) 'Pengaruh Terapi Rendam Kaki Menggunakan Air Hangat Terhadap Perubahan Tekanan Darah Lansia Hipertensi Di Poslansia Amanah Klaten'.

Sheppard, J. P. *et al.* (2020) 'Effect of Antihypertensive Medication Reduction vs Usual Care on Short-term Blood Pressure Control in Patients with Hypertension Aged 80 Years and Older: The OPTIMISE Randomized Clinical Trial', *JAMA - Journal of the American Medical Association*, 323(20), pp. 2039–2051. doi: 10.1001/jama.2020.4871.

Sinurat, E. R. L., Ningsih, S. D. and Syapitri, H. (2020) 'Pengaruh Rendam Kaki dengan Air Hangat Terhadap Penurunan Tekanan Darah pada Lansia Hipertensi Di Kelurahan Gaharu', *Jurnal Online Keperawatan Indonesia*, 3(1), pp. 58–65.

Smaje, A. *et al.* (2018) 'Factors associated with medication adherence in older patients: A systematic review', *Aging Medicine*, 1(3), pp. 254–266. doi: 10.1002/agm2.12045.

Sudiartawan, Putu and Adnyana, M. (2022) 'Efficacy of Hydrotherapy Soak Feet in Lowering Blood Pressure of Hypertension Sufferers in Dauhwaru Village, Jembrana', *Science Midwifery*, 10(4), pp. 2954–2962. doi: 10.35335/midwifery.v10i4.715.

Suwandewi, A. and Rizani, K. (2022) 'The Effect of Therapy Modality of Warm Water Foot Soak on Blood Pressure in the Elderly', 1(2), pp. 19–25.

Wantiyah, ., Husada, B. A. and Susumaningrum, L. A. (2019) 'Foot Soaking Therapy with Warm Water Decrease Blood Pressure of Patients with Hypertension', (Inc), pp. 89–93. doi: 10.5220/0008321000890093.

Webb, R. C. and Inscho, E. W. (2007) 'Age-Related Changes in the Cardiovascular System', *Hypertension in the Elderly*, (June 2014), pp. 11–21. doi: 10.1007/978-1-59259-911-0_2.

Widiharti, W., Widiyawati, W. and Fitrianur, W. L. (2020) 'Faktor-Faktor yang Berhubungan dengan Tekanan Darah pada Masa Pandemi Covid-19', *Journal Of Health Science (Jurnal Ilmu Kesehatan)*, 5(2), pp. 61–67. doi: 10.24929/jik.v5i2.1089.

World Health Organization (2021) 'Advocacy brief: Social isolation and loneliness among older people', *Decade of healthy ageing*, pp. 1–20. Available at: https://www.who.int/publications/i/item/9789240030749.