



## Article Review

# The Effect of Foot Soak Therapy Using Warm Water on the Lowering Blood Pressure in Patients with Essential Hypertension

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### Abstract

Essential hypertension is an increase in blood pressure with no known cause. Management of hypertension can be done non-pharmacologically such as massage, acupuncture, meditation, herbal treatment, and foot soak therapy using warm water. Foot soak therapy using warm water are inexpensive and effective. In 2021, Sungai Sariak Community Health Center patients had hypertension second most often. It provides therapy in the form of drugs like amlodipine, but a nurse interviewed said they had never provided education about foot soak therapy using warm water. The study examined the foot soak therapy using warm water on blood pressure in patients with essential hypertension. This study employed experimental design through Purposive Sampling to choose 25 hypertensive patients. The average systolic blood pressure of people with hypertension before giving foot soak therapy using warm water was 156.96 and after giving foot soak therapy using warm water was 142.40, the average diastolic blood pressure of people with hypertension before giving foot soak therapy using warm water was 88.44 and after giving foot soak therapy using warm water was 81.44, there was an effect of foot soak therapy using warm water on blood pressure in people with essential hypertension with  $p$  value = 0.000 ( $< 0.05$ ) for the systolic blood pressure variable and for the diastolic blood pressure variable, a  $p$  value = 0.006 ( $< 0.05$ ). Foot soak therapy using warm water has a significant effect on reducing blood pressure in hypertension sufferers.

## INTRODUCTION

The term "hypertension" refers to an increase in blood pressure that results in symptoms that continue to affect a target organ, such as right ventricular hypertrophy (for the heart muscle), coronary heart disease (for the heart's blood arteries), and stroke (for the brain). Hypertension is the primary cause of stroke, which has a high death rate and has the brain as its target organ<sup>3</sup>. There are two

types of hypertension, namely essential hypertension and secondary hypertension. Essential or primary hypertension is hypertension with no known cause, while secondary hypertension is hypertension caused by certain diseases such as kidney disease and hyperthyroidism<sup>9</sup>.

According to the World Health Organization, approximately 40% of adults aged 25 and older have been diagnosed with hypertension worldwide. Africa has the

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greatest prevalence of hypertension at 46%, while the United States has the lowest prevalence at 35%<sup>16</sup>. Based on fundamental health research conducted in 2018, the prevalence of hypertension among Indonesians aged 55 to 64 has increased by 55.2%<sup>10</sup>. West Sumatra has a prevalence of hypertension of 25.6%, with 176,169 cases detected by measuring blood pressure<sup>9</sup>.

Hypertension can be treated in both pharmaceutical and non-pharmacological ways. medications to control blood pressure, including thiazide diuretics, angiotensin converting enzyme inhibitors, beta-blockers, potassium replacement therapy, and urinary tract inhibitors. But the aforementioned drugs can raise the chance of developing diabetes, especially in people who are already at risk. Beta-class pharmaceuticals and diuretics are the hypertension medications most likely to cause diabetes<sup>15</sup>. Non-pharmacological therapies that fall under the purview of nursing are also created as stand-alone nursing interventions. Examples include warm-water foot soak therapy, massage, acupuncture, and herbal therapy. The most successful treatment among those mentioned above is foot soak therapy with tepid water since it is more efficient, straightforward, affordable, and practicable at home<sup>11</sup>.

The benefit or effect of warm water is that it causes liquids, solids, and gases to expand in all directions and speeds up chemical processes. Along with the occurrence of metabolism, there will be an increase in the interchange of bodily substances and fluids in tissues. The biological effects of heat/warmth may cause blood vessels to swell and blood flow to rise. Vasodilation, a decrease in blood viscosity, a reduction in muscular tension, an increase in tissue metabolism, and an increase in capillary permeability are all physiological responses of the body to heat. For therapeutic reasons, this heated reaction is applied to a range of bodily illnesses and maladies<sup>1</sup>.

The incidence of hypertension in Padang Pariaman was 22%<sup>15</sup>, while in the Sungai Saria Community Health Center working area, hypertension was the second most prevalent disease after diabetes in 2021, with a total of 325 cases. The Community Health Center provides therapy in the form of drugs such as amlodipine. Based on the results of an interview with one of the nurses, it was determined that they had never provided education about foot immersion therapy using warm water. In general, the officers only provided health education pertaining to foods that must be consumed in moderation, or they provided medications.

Hypertension is the leading cause of stroke, which is a leading cause of death. High blood pressure is known as the silent murderer because it is a fatal disease that can affect people of any age. Hypertension is one of the world's deadliest diseases. This disease affects as many as 1 billion persons in the world, or 1 in 4 adults. Approximately 92-94 percent of cases of hypertension are caused by primary hypertension. In other words, the majority of causes of hypertension are unknown. Hypertensive complications include coronary heart disease (CHD), heart failure, cerebral injury, and damaged blood vessels.

There are both pharmacological and non-pharmacological ways to treat hypertension. Medications such as thiazide diuretics, angiotensin converting enzyme inhibitors, beta-blockers, potassium replacement, and urinary tract inhibitors for lowering blood pressure. However, the aforementioned pharmaceuticals can increase the risk of diabetes, particularly in those who are already at risk. Beta-class pharmaceuticals and diuretics are the hypertension medications most likely to cause diabetes. Foot soak therapy using warm water is more effective, simple, and inexpensive; it can be performed at home; and it reduces other hazards associated with drug treatment. The results of this study are anticipated to reduce blood

pressure in hypertensive patients who undergo foot immersion therapy with tepid water, facilitate the care of hypertensive patients by nurses and other medical professionals, and aid in the healing of patients at no cost. Foot soak therapy using warm water can be used as a preventative health center program to reduce hypertension recurrence. By reducing the recurrence rate of hypertension in an area, the community's health will improve, making the local government's efforts to prevent recurrence of hypertension a success.

From the data above, researchers are interested in conducting research on "The Effect of Foot Soak Therapy Using Warm Water on the Lowering Blood Pressure in Patients with Essential Hypertension".

## **METHODS**

This study employed a pre-experimental design with a one-group pre- and Post-test framework. The one group pretest - posttest research design is a study in which there is no comparison group (control), but the first observation (pretest) has been conducted in order to investigate the changes - changes that occur following the experiment, by using the Purposive Sampling technique, the sample size was calculated for hypertension sufferers at the Sungai Sariaik Health Center in 2021. So that the sample was selected 25 respondents with the criteria of having essential hypertension and not taking anti-hypertensive drugs in the past week.

Demographic data and observation notes to collect data were used. The researchers received permission from LP2M UNP before conducting the research. The researcher delivered the letter to Kesbangpol Padang Pariaman after obtaining permission to conduct research from LP2M. After receiving an introduction letter from the Kesbangpol, the researchers proceeded to the Sungai Sariaik Community Health Center, where he

handed the letter to the Administration section. The researchers then obtained information regarding the prevalence of hypertension. In addition, one nurse in command of the hypertension program at c was interviewed by the researchers. The researchers then discussed the benefits of foot immersion therapy with tepid water for lowering blood pressure. The researcher then traveled to the research location to observe the Integrated Service Post and community dwellings that would serve as research samples. The research technique consists of a pre- and post-test. Researchers provide information to all respondents who will be sampled for this study, and each respondent has the option to refuse or accept inclusion in the sample. Those willing to serve as a sample are required to complete an informed consent form as evidence of their willingness to serve as a sample. Before administering the treatment, the researchers measured the patient's blood pressure using a sphygmomanometer. If the respondent's systolic blood pressure is greater than 140 mmHg and diastolic blood pressure is greater than 90 mmHg, they have hypertension and will be included in the study. After that, the researchers administered foot immersion therapy for 15 to 30 minutes using water heated to 30 to 40 degrees Celsius. After administering the therapy, the researcher remeasured blood pressure 15 minutes later and completed the observation document. The study was conducted on two consecutive days per week with the same patient; however, if the hypertensive patient's blood pressure does not decrease following the study, it is recommended that therapy be administered five times per week. The investigation lasted one month. After all data has been acquired, the researchers processes the data using SPSS.

## **RESULTS**

The research was conducted from 1 to 31 July 2022 in the working area of the Sungai Sariaik Community Health Center on a total

sample of 25 individuals with hypertension to determine the effect of tepid water foot immersion therapy on their blood pressure. This form of research is a Pre-Experimental Design with One-Group Pretest and Posttest, which reveals causal relationships using a single subject group. The subject group was observed prior to the intervention, then again following the intervention.

Univariate analysis was used to calculate the average systolic blood pressure for patients with hypertension.

Table 1  
Average Systolic Blood Pressure for Patients with Hypertension in the Work Area of the Sungai Sariak Community Health Center in 2022 (n=25)

Systolic Blood Pressure	Mean	Std. Dev	Min	Max
Pre-Test	156,96	10,58	141	181
Post-test	142,40	12,31	128	75

Based on table 1, it can be concluded that the average systolic blood pressure of people with hypertension before giving warm water foot immersion therapy was 156.96 and after giving warm water foot immersion therapy was 142.40.

Table 2  
Average Diastolic Blood Pressure for People with Hypertension in the Sungai Sariak Community Health Center Work Area in 2022 (n=25)

Diastolic Blood Pressure	Mean	Std. Dev	Min	Max
Pre-Test	8,44	8,83	65	100
Post-test	81,44	8,76	67	98

Based on table 2, it can be concluded that the mean diastolic blood pressure of people with hypertension before giving warm water foot immersion therapy was 88.44 and after giving warm water foot immersion therapy was 81.44.

*Normality test*

The normality test uses the Shapiro-Wilk test because it is a study that has a small sample (<30).

Table 3  
Normality Test

Variable	Group	Mean	Std. Dev	p
Systolic Blood Pressure of the Hypertension Society	Pretest	156,96	10,58	0,19
	Posttest	142,40	12,31	0,5
Diastolic Blood Pressure of the Hypertension Society	Pretest	88,44	8,83	0,11
	Posttest	81,44	8,76	0,16

Based on table 3 above where the normality test uses the Shapiro-Wilk test it is known that the p value for systolic blood pressure before being given foot immersion therapy using warm water is 0.19 and after being given foot immersion therapy using warm water is 0.5. Because the p value of systolic blood pressure before and after being given foot immersion therapy using warm water > 0.05, it can be concluded that the systolic blood pressure data of the respondents was normally distributed.

Based on table 3 above where the normality test uses the Shapiro-Wilk test it is known that the p value for diastolic blood pressure before being given foot immerse therapy using warm water is 0.11 and after being given foot immerse therapy using warm water is 0.16. Because the p value of diastolic blood pressure before and after being given foot immerse therapy using warm water > 0.05, it can be concluded that the respondent's diastolic blood pressure data is normally distributed.

*Bivariate Analysis*

Assessment of blood pressure in each patient with hypertension shows different results. Researchers used a statistical test Paired sample t-test to compare blood pressure before and after the intervention.

Table 4  
The Effect of Foot immerse Therapy Using Warm Water on Blood Pressure in People with Hypertension in Sungai Sariak Community Health Center in 2022 (n=25).

Variable	Mean	Std Error	95% Confidence Interval of the Difference		p
			Lower	Upper	
			Systolic blood pressure	14,56	
Diastolic blood pressure	7,00	2,32	2,22	11,78	0,006

Table 4 shows the effect of foot immerse therapy using warm water on the blood pressure of people with hypertension in the Sungai Sariak Community Health Center in 2022 with a mean difference in systolic blood pressure of 14.56 and a difference in mean diastolic blood pressure of 7.00. Based on statistical tests using the Dependent t test, it obtained a p value = 0.000 (<0.05) for the systolic blood pressure variable and for the diastolic blood pressure variable, a p value = 0.006 (<0.05) which means that there is an effect of immersing therapy feet using warm water on the blood pressure of people with hypertension in the Sungai Sariak Community Health Center in 2022.

**DISCUSSION**

The results of data analysis using the Dependent t test obtained a p value = 0.000 (<0.05) for the systolic blood pressure variable and for the diastolic blood pressure variable, a p value = 0.006 (<0.05) which means that there is an influence foot immerse therapy using warm water on the blood pressure of people with hypertension in the Sungai Sariak Community Health Center working area in 2022.

The results of this study are in line with research conducted by Dewi, E. U. (2016) using the Wilcoxon test. From the results of the study, before giving warm water foot immerse therapy, the most respondents

experienced stage 1 hypertension, namely 9 people (56.25%) and after giving warm water foot immerse therapy, it was found that the most respondents experienced pre hypertension, namely 10 people (62.5 %). After that, the Wilcoxon test was carried out with a result of 0.02, which means that there is an effect of warm water foot immerse therapy on changes in blood pressure.

Nazaruddin, et.al (2021) also conducted the same research using a Pre-Experimental design by taking a "One Group Pre and Post-Test Design" approach. The results of the analysis test obtained the results of the systolic p value = 0.000 and the results of the diastolic p value = 0.000, it can be interpreted that foot immerse therapy with warm water is effective in reducing blood pressure in hypertensive patients.

According to Peni (2008) hypertension sufferers in their treatment do not only use drugs but can use cheaper and easier methods, namely by using warm water foot immerse therapy which can be used as a therapy that can restore stiff joint muscles and can cure strokes if carried out continuously through awareness and discipline. Water therapy is a method of treatment and healing by expecting to get therapeutic or healing effects. This water therapy uses warm water where warm water functions to expand the muscle tissue of blood vessels and develop all the muscles that distribute blood to all organs in the body so that blood circulation is smoother and can have a relaxing effect on people with hypertension.

The effects of hypertension in older people differ from those in adults. Blood vessels are affected by warm water, which increases blood flow. Because elderly hypertension differs from adult hypertension, there are differences in how blood pressure is controlled. Blood pressure regulation may be impacted by aging-related changes to the cardiovascular system's structure and function. What makes it unique in young people is a hyperkinetic circulatory state

brought on by heightened vascular sensitivity to catecholamine. However, there is no increase in systemic vascular resistance as a result of these events in cardiac output, contractility, or heart rate. Unlike systemic hypertension, which only affects persons over the age of sixty. Vascular radius narrowing is linked to less vascular expansion and more systemic resistance. This can be minimized by therapy using warm water. The body is easier to move, blood circulation improves and there is calm due to hydrostatic, hydrodynamic and thermal effects. Warm water is widely used for treatment because of its hydrostatic and hydrodynamic properties. Warm water has a physiological effect on the body. Warm water has an effect on blood vessels and improves blood flow.

Immersing your feet in warm water needs to be done regularly so that your feet are warm and blood flow throughout your body is also smooth. The heat in the head will go down if the feet are warm. This helps reduce the risk of anxiety, insomnia, sore shoulders, hypertension, stroke and heart attack. Blood flow in the heart will also improve, urination will become smooth and swelling will disappear. Besides that, immersing your feet is also good for accelerating blood circulation. Other effects that are used in medicine are the effects of heat and chemical effects.

Doing foot immerse therapy with warm water can be done at any time. The effect of immersing feet in warm water is the same as walking with bare feet for 30 minutes. Scientifically, warm water has a physiological impact on the body. First, it has an impact on blood vessels, warm water will make blood circulation smooth. However, in this study there were elderly whose blood pressure did not decrease. Based on observational data obtained during the post test, the systolic blood pressure of the respondents was still in the hypertension range, namely 160 and 150 mmHg. This is caused by getting older, the organs of the body also experience aging

related to endothelial diffusion which is related to blood vessel stiffness and hypertension can occur, therefore in the elderly it is difficult to return to normal blood pressure because blood vessels experience stiffness and it is difficult to stretch like Initially, that is why blood pressure in the range of 160 mmHg is still in the fixed category at ages belonging to the 60 and 70 years it is difficult to go down, even though some have experienced a decrease in blood pressure, apart from that this is also due to differences in lifestyle such as caffeine consumption, lack of exercise, and stress factors are confounding variables that cannot be fully controlled by researchers.

The results of the research conducted by the researchers showed a significant decrease in systolic and diastolic blood pressure, which means that warm water foot immerse therapy has an effect on reducing blood pressure in people with hypertension. This is evidenced by a decrease in systolic and diastolic blood pressure values as shown in table 4 before and after warm water foot immerse therapy.

## CONCLUSION

After conducting research from 01 to 31 July 2022 with 25 respondents, the results showed that the average systolic blood pressure of people with hypertension before giving foot immersion therapy using warm water was 156.96 and after giving foot immersion therapy using warm water was 142 .40, the average diastolic blood pressure of people with hypertension before giving foot immersion therapy using warm water was 88.44 and after giving foot immersion therapy using warm water was 81.44, there was an effect of foot soak therapy using warm water on blood pressure in people with essential hypertension in the Sungai Sariak Community Health Center working area in 2022 with a p value = 0.000 (< 0.05) for the systolic blood pressure variable and for the diastolic blood pressure variable, a p value

= 0.006 (< 0.05). Thus, it can be concluded that the application of foot soak therapy using warm water has a significant effect on reducing blood pressure in hypertension sufferers, especially for the elderly who are tired of taking medicines obtained from health centers or hospitals.

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## CONFLICT OF INTEREST

There is no conflict of interest to declare from this researches.

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