

Original Research Article

Application Therapy of Warm Water Foot Soak with a Mixture of Salt and Red Ginger (*Zingiber officinale Roscoe*) on Lower Blood Pressure in Hypertension Patients

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Abstract

Background: Approximately 1.56 billion adults in 2020 suffer from hypertension, and 8 million die yearly. Treating non-pharmacological hypertension with warm water foot soak therapy combined with salt or red ginger (*Z. officinale Roscoe*) can help blood circulation smoothly. **Purpose:** The study aimed to compare the application of warm water foot soak therapy with a mixture of salt and red ginger (*Z. officinale Roscoe*) to reduce blood pressure in hypertensive patients. **Methods:** The method used is descriptive with a case study approach on four respondents with hypertension. The measuring instrument used to measure blood pressure is a digital tensimeter. **Results:** Blood pressure decreased in four respondents before therapy, soaking feet in warm water with a mixture of salt and red ginger (*Z. officinale Roscoe*) respectively R1 = 140/98 mmHg, R2 = 150/90 mmHg, R3 = 149/99 mmHg, R4 = 158/96 mmHg and after six consecutive days of water foot soak therapy R1 = 133/88 mmHg, R2 = 129/80 mmHg, R3 = 129/85 mmHg, R4 = 130/88 mmHg. **Conclusion:** Therapy soaking feet in warm water with a mixture of salt and red ginger (*Z. officinale Roscoe*) is effective for lowering blood pressure, but it is recommended to use red ginger (*Z. officinale Roscoe*).

Keywords: Hypertension, Warm Water Foot Soak Therapy, Salt, Red Ginger (*Zingiber officinale Roscoe*)

1. INTRODUCTION

Hypertension is a condition of blood pressure in people who experience an increase due to poor blood flow that can hinder the supply of oxygen and nutrients to the body (Marbun, 2022). Approximately 1.56 billion adults in 2020 are estimated to suffer from hypertension; as many as 8 million people die from it yearly. The data above shows that in the world, one in three people is suffering from hypertension. Hypertension cases in 2025 are expected to increase by about 80%, especially in developing countries (World Health Organization, 2020). The prevalence of hypertension in Indonesia was obtained by measuring the population over the age of 18 years and found as many as 63,309,620

cases, or about 34.1% of hypertensive patients, and a mortality rate of 427,218 (Kemenkes RI P2PTM, 2019). East Kalimantan found about 29.9% of hypertension cases that attacked at the age of ≥ 18 (Kementrian Kesehatan R.I, 2017). The prevalence of essential hypertension in East Kalimantan, especially in Samarinda, is 48,849 cases (Badan Pusat Statistik Kota Samarinda, 2018).

Many hypertension cases can lead to various complications and signs and symptoms. In Indonesia, complications of hypertension include coronary heart disease at 0.5%, diabetes at 1.5%, renal failure at 0.13%, and hyperthyroidism at 0.4%. The number of complications faced can cause a decrease in quality of life and increase mortality rates (Arifin & Mustafa, 2021). People can control mortality rates and decreased quality of life through hypertension management. Hypertension can be treated through pharmacological and non-pharmacological therapies. Pharmacological therapy can be in the form of anti-hypertensive drugs such as amlodipine and bisoprolol; these two drugs have a mechanism of action in the body that can inhibit calcium ions that enter smooth muscles in blood vessels and heart muscle so that it will make blood vessels relax and reduce heart work so that blood pressure can decrease (Tutoli et al., 2021). While non-pharmacological therapy, for example, can be done through warm water foot soak therapy at a temperature of 39-40 ° C. Warm water has a physiological effect that can be used to reduce blood pressure. Warm water has a physiological effect that can help improve blood vessel flow, make the heart work more stable, and strengthen muscles and ligaments in the joints (Bariyah & Nurpratiwi, 2021).

Warm water foot bath therapy can be combined with salt, which has many benefits for the body, such as helping restore energy to the body and helping repair nervous system tissue. Several kinds of literature stated that soaking feet in warm water mixed with salt could make the body feel calmer and more relaxed, and there is a positive effect of soaking feet in warm water with a mixture of salt (Bariyah & Nurpratiwi, 2021). It can be concluded from the results of other studies that there is an effect of warm water foot soak with salt in hypertensive patients in lowering blood pressure because salt contains sodium chloride (NaCl), which has the function of maintaining acid-base balance in the body and plays a role in muscle contraction. Salt can increase capillary permeability and improve blood circulation (Pratama et al., 2022).

In addition to salt, herbal ingredients such as ginger can be a combination of warm water foot soak therapy. Several gingers are already known by the surrounding community, such as yellow ginger (ginger imprint) and rhino ginger (elephant ginger), and ginger is often used as medicine, namely red ginger. Compared to other ginger variants, the essential oil content in red ginger (*Z. officinale* Roscoe) is higher. Warm ginger foot soak therapy aims to help blood circulation become smooth (Sriyatna & Rahayu, 2022).

According to research by Nurahmandani (2016), warm ginger foot bath therapy can help the process of dilating blood vessels because there is a warm taste in ginger, and the spicy aroma of ginger has oleoresin compounds (gingerol) and essential oils (volatile). The brain will respond to the warm taste of ginger, and then the afferent nerves will receive commands from the brain and forward them to the central nervous system to release histamine and acetylcholine. The release of citicoline causes a reduction in sympathetic nerve activity which makes arterial and venous blood vessels dilate so that they can smooth blood vessels (Rahmadani, 2021).

2. METHOD

This research design uses a descriptive method with a case study approach. The case study research consisted of four respondents who were conducted by direct observation in the form of warm salt and red ginger (*Z. officinale* Roscoe) foot soak therapy and the results of blood pressure checks before and after warm salt and ginger foot soak therapy for six days. Inclusion criteria of research; patients with grade 1 hypertension having had blood pressure checks with a distance of 1 week at least two times the examination, patients with hypertension aged ≥ 18 to 45 years, and patients with hypertension who are willing to carry out warm salt and red ginger (*Z. officinale* Roscoe) foot soak therapy. The exclusion criteria in this study; patients with prehypertension and grade 2 hypertension and hypertensive patients with leg injuries.

The data collection procedures used in this study are:

1. Researchers asked for a permission letter from Mulawarman University of Samarinda to conduct research in the Lempake Samarinda village.

2. If you have obtained permission from the D-III Nursing Study Program, Faculty of Medicine, Mulawarman University, then submit it to the Health Research Ethics Commission, Faculty of Medicine.
3. Researchers obtained a research permit from the Faculty of Medicine, Mulawarman University, Samarinda in April 2023 which was then submitted to the Lempake health center as a place to conduct research.
4. Researchers went to the Lempake health center to look for data on hypertensive patients according to the inclusion criteria.
5. The researcher visits the respondent's house and takes blood pressure measurements to the respondent with a distance of 1 week at least 2 times to ensure that the respondent has hypertension and provides an explanation of the research to be carried out and can sign a consent sheet if the prospective respondent is willing to become a respondent.
6. Researchers obtained four respondents according to the inclusion and exclusion criteria.
7. The researcher contracts the time tomorrow morning to carry out warm salt and red ginger (*Z. officinale Roscoe*) foot soak therapy, then the researcher prepares the tools and materials used to carry out warm salt and red ginger (*Z. officinale Roscoe*) foot soak therapy. Then mix warm water that has been measured at a temperature of 39 ° C-40 ° C as much as 1.5-3 liters with 50-70 grams of salt, as well as red ginger (*Z. officinale Roscoe*) using warm water with a temperature of 39 ° C-40 ° C as much as 3 liters with 100 grams of red ginger, before the warm salt and red ginger (*Z. officinale Roscoe*) foot soak therapy, blood pressure measurements were taken on the respondents and this therapy was carried out for about 15 minutes in the morning.
8. After the warm salt and red ginger (*Z. officinale Roscoe*) foot bath therapy, the researchers measured blood pressure again.
9. Researchers conducted warm salt and red ginger (*Z. officinale Roscoe*) foot bath therapy to respondents for seven consecutive days and checked blood pressure before and after warm salt and red ginger (*Z. officinale Roscoe*) foot bath therapy.

10. Furthermore, researchers can collect the results of the observations that have been filled in and conduct temporary or final termination to the respondents.
11. Researchers process data and analyze the results of observations that have been obtained.

3. RESULT AND DISCUSSION

The results regarding biographical data containing gender, age, occupation, and history of hypertension in respondents (Table 1).

a. Gender

Blood pressure is one of the factors that can be influenced by gender. This study found that women were more likely to develop hypertension than men (Falah, 2019). According to experts, women have a greater risk of getting sick than men, related to the immune system in women more prone to decline. In addition, related to women's activities that are dense at home and play a role as a housewife makes it harder to work, so it is draining, and women are prone to fatigue, decreased immune system, and illness (Yunus et al., 2021).

From other hypertension studies, patients of the female gender have more numbers at 65% than men at 35%. This is because women are more easily stressed than men. Blood pressure can increase because stress is associated with hypertension through sympathetic nerves. When stressed, the hormone adrenaline or epinephrine will be released. A person will experience increased blood pressure if adrenaline raises blood pressure through arterial contraction (vasoconstriction) and heart rate increases (Agustina et al., 2015).

b. Age

The age of respondents in this application, namely R1, aged 43; R2, aged 41; R3, aged 42; and R4, aged 45. The incidence of hypertension is often associated with age. Because with the increasing age of a person, there will be reduced elasticity in arterial blood vessels. This can be caused by a buildup of hypertrophy and collagen of thin, fragmented smooth muscle cells and broken elastin fibers. The increasing age of a person can occur structural abnormalities, namely endothelial dysfunction, causing arterial blood vessel stiffness to increase (Ashfiya et al., 2017).

The average age of respondents is in middle adulthood, by the theory that has been conveyed that the risk of hypertension will increase with age. Endothelial dysfunction is related to age, and in hypertension, arterial stiffness will increase, especially hypertension in old adulthood. This study's results align with previous research where hypertension is experienced by most respondents (middle adults) aged more than 41 years (Ekarini et al., 2020).

Table 1. Respondent characteristics

No.	Respondent	Gender	Age	Address	Education	Jobs	Length of illness
1	R1	Woman	43	Samarinda	SMP	IRT	Four years
2	R2	Woman	41	Samarinda	SMP	IRT	Three years
3	R3	Woman	42	Samarinda	SD	IRT	Three years
4	R4	Woman	45	Samarinda	SD	IRT	Four years

c. Jobs

Respondents in this application, namely R1, R2, R3, and R4, act as housewives. Women who serve as housewives or who do not work have a higher risk of developing hypertension than women who work; this can be caused by less physical activity, which can increase the risk of excessive body weight so that the risk of suffering from hypertension (Rahayu et al., 2021). Very different from someone who works; they have more activities outside and are more active than people who do not. Hypertension is more at risk in people who do not work than people who work (Martiningsih et al., 2018).

d. Education

Respondents with a low level of education greatly influence their hypertension because their lack of health knowledge will cause less effective thinking in responding to and taking care of their health problems (Yuwono et al., 2017).

Respondents with low and middle education levels have a 2.9 times risk of developing hypertension than respondents with a high education level (Waas et al., 2013). A person with a lower level of education will find it easier to receive information, so he needs more knowledge. Respondents with low education levels need more information about the disease or awareness of blood pressure control (Darussalam & Warseno, 2017).

Applying Warm Water Foot Soak Therapy with a Mixture of Salt and Red Ginger (*Z.officinale Roscoe*).

Foot soak therapy is a therapy that can help blood circulation increase and a lot of oxygen into the tissue resulting in dilated blood vessels (Astutik & Mariyam, 2021). Hydrotherapy (warm water foot soak with the salt mixture) is a straightforward natural therapy because this treatment method does not use modern medicines and has no harmful side effects (Loke, 2021). Salt is a combination of chemical compounds with the largest constituent, NaCl. The body generally can balance sodium outside and potassium inside the cell when sodium levels are low. The hormone aldosterone maintains the sodium concentration in the blood to keep it at a normal value. When a person loses sodium, water will enter the cells to dilute the sodium in the cells so that the extracellular fluid will decrease, and the fluid balance will also be disturbed. These changes may lower blood pressure (Tomayahu et al., 2023).

Warm water foot bath therapy with a salt mixture aims to reduce edema, improve blood circulation, stabilize heart work, relax muscles, increase muscle relaxation, ease muscle pain, relieve stress, increase capillary permeability, reduce pain, and help the body stay warm. Therefore, this therapy is perfect for lowering blood pressure in hypertension. The working principle of this therapy is through heat

transfer from warm water into the body so that blood vessels can expand and muscle tension is reduced (Fitriana et al., 2021).

Table 2. Blood Pressure Before and After Warm Water Foot Soak Therapy with Salt

Respondent Code	Day to	Blood Pressure Frequency	
		Before	After
R1	1	140/98	135/90
	2	140/91	132/80
	3	145/93	135/80
	4	142/88	132/80
	5	148/91	142/80
	6	140/98	133/88

Table 3. Blood Pressure Before and After Warm Water Foot Soak Therapy with Salt

Respondent Code	Day to	Blood Pressure Frequency	
		Before	After
R2	1	150/90	140/80
	2	140/90	132/81
	3	146/98	139/88
	4	140/90	130/80
	5	137/95	134/90
	6	140/88	129/80

Table 4. Blood Pressure Before and After Warm Water Foot Soak Therapy with Red Ginger (*Z. officinale Roscoe*).

Respondent Code	Day to	Blood Pressure Frequency	
		Before	After

R3	1	149/99	139/89
	2	148/91	132/88
	3	142/90	132/81
	4	141/96	130/85
	5	140/93	130/88
	6	140/92	129/85

Table 5. Blood Pressure Before and After Warm Water Foot Soak Therapy with Red Ginger (*Z. officinale Roscoe*)

Respondent Code	Day to	Blood Pressure Frequency	
		Before	After
R4	1	158/96	140/91
	2	145/93	133/87
	3	148/92	132/80
	4	142/97	130/80
	5	143/90	135/80
	6	140/91	130/88

In addition to salt, ginger warm water foot baths can reduce pain, improve sleep, open pores, dilate blood vessels, and relax muscles. Several herbs are often combined to perform foot hydrotherapy, including red ginger (*Z. officinale Roscoe*). Chemical compounds found in red ginger rhizomes are gingerol, oleoresin, and essential oil. The content of essential oil in red ginger is around 2.58-3.90% and the highest compared to other types of ginger (Silfiyani & Khayati, 2021).

This essential oil content gives ginger a distinctive aroma, spicy sensation, and warmth. This warm sensation can dilate blood vessels (vasodilation) so blood circulation is smoother and relieve the heart from pumping blood. It can reduce blood pressure (Silfiyani & Khayati, 2021). Soaking the feet in warm water has a relaxing effect, reduces pain and the ability to move can increase. Warm water scientifically has a physiological impact on the body. The hydrostatic water

pressure on the body encourages the dilation of blood vessels from the legs to the chest cavity, and blood accumulates in the heart's blood vessels. Warm water will dilate blood vessels (Muksin et al., 2023).

Warm water foot soaking with a salt mixture effectively lowers blood pressure and can increase comfort in people with hypertension (Bariyah & Nurpratiwi, 2021). However, warm water foot soaks with ginger are more effective for reducing blood pressure in hypertensive patients (Bangun & Silalahi, 2022). Based on the research that has been done, it is more advisable for hypertensive patients to utilize warm water footbath therapy with ginger as an alternative therapy to lower blood pressure. It can perform warm water footbath therapy with ginger at home in a disciplined and regular manner (Nurpratiwi et al., 2021).

Figure 1. Differences in Systolic Blood Pressure Decrease in Respondents

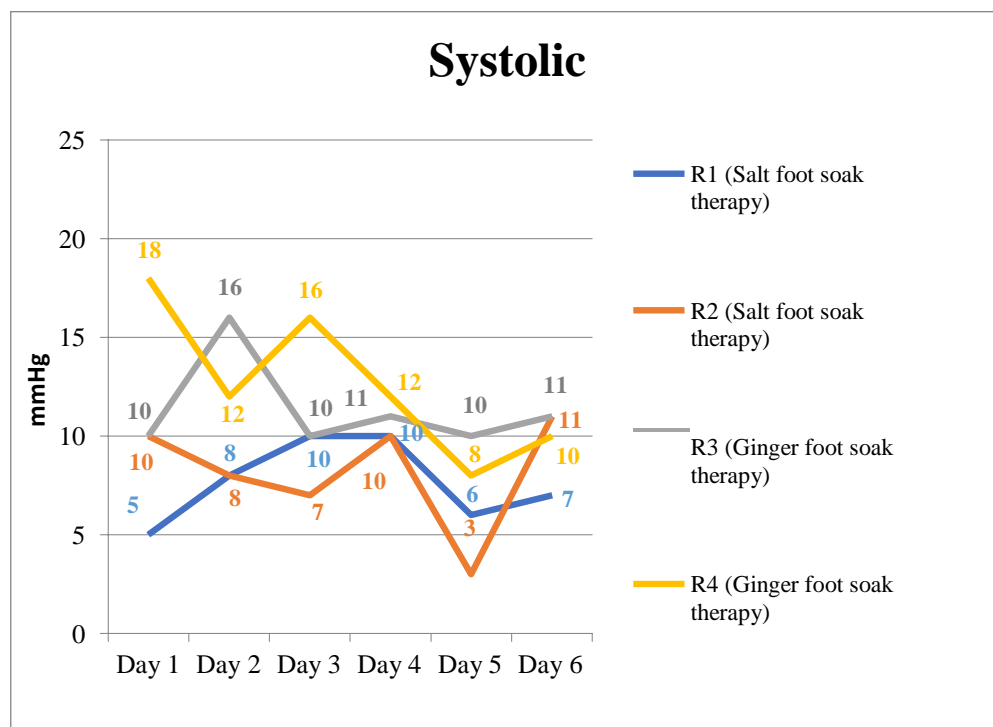
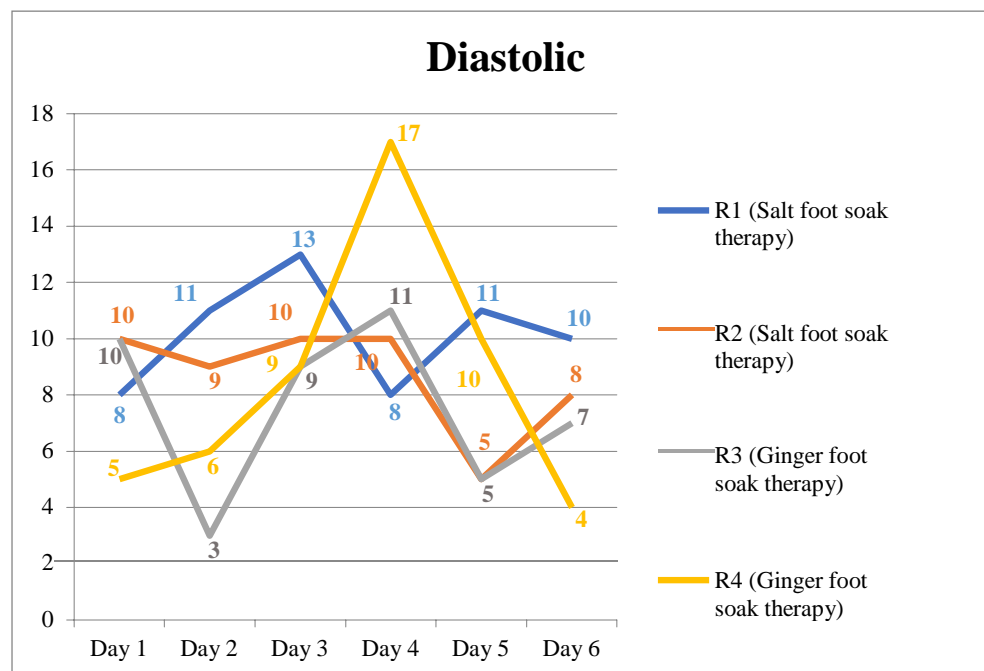


Figure 2. The difference in Diastolic Blood Pressure Decrease in Respondents



4. CONCLUSION

Warm water foot bath therapy with salt and red ginger (*Z. officinale Roscoe*) effectively lowers blood pressure. Still, it is recommended to use red ginger (*Z. officinale Roscoe*).

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