

# The Effect of Foot Soak Using Red Ginger Water and Physical Activity on Blood Pressure Reduction

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## Abstract

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**Introduction:** Hypertension is a deadly disease known as a silent killer and fourth rank in West Java province such 29.4% of cases. Management of hypertension can be done with pharmacological or non-pharmacological therapy. Red ginger is one of the non-pharmacological therapies.

**Objective:** This study aims to determine the relationship between foot soaking using red ginger water and physical activity on decreasing blood pressure level in Sakawayana Village. **Method:** This study was a one-group, pretest-posttest quasi-experimental design. The number of samples in this study was 40 people that was selected based on inclusion criteria. **Result:** This study indicates that the average blood pressure after receiving foot soak therapy using red ginger water and physical activity was 147.4 mmHg systolic pressure and 91.5 mmHg for diastole with a p-value <0.05. **Conclusion:** There is a relationship between foot soaking using red ginger water and physical activity in lowering blood pressure in Sakawayana Village.

**Recommendations:** Further study need to apply this intervention with different population to ensure the effectiveness of red ginger therapy for health outcomes.

**Keywords:** hypertension, physical activity, red ginger



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## INTRODUCTION

Hypertension is a disease that can be inherited or genetic and is characterized by a systolic pressure exceeding 140 mmHg and a diastolic pressure exceeding 90 mmHg (1). Hypertension is also a health problem that requires attention because it is a global disease that can cause death in developed and developing countries, including Indonesia. The world population with hypertension for men is about 26.6%, and for women is around 26.1%.

The prevalence of hypertension in Indonesia at the age of 18-24 years is 13.2%, 25-34 years is 20.1%, 35-44 years is 31.6%, 45-54 years is 45.3%, 55-64 years 55.2%, 65-74 63.2% and >75 years 68.5% (2). Hypertension in Indonesia shows that in rural areas, there are still many people with hypertension who health services have not reached due to the absence of complaints from most sufferers.

The impact of untreated hypertension will occur in the calcification of the walls of the heart blood vessels, which will cause reduced blood flow in some parts of the heart muscle. High blood pressure will force the muscles to work harder to pump blood throughout the body; where this condition causes the heart muscle to thicken so that the pumping power of the heart muscle will decrease and will result in heart failure, vessel damage, kidney failure where the kidneys are no longer able to function properly (3).

Management for patients with hypertension can be done in 2 ways, namely pharmacological and non-pharmacological therapy. Pharmacological therapy is therapy carried out with medicinal drugs. Non-pharmacological therapy uses natural ingredients or therapy that can be done alone without medical drugs, such as routine physical activity, consuming a balanced diet, reducing sodium intake, reducing caffeine consumption, and doing foot baths using ginger water (4).

Ginger is a root crop from South Asia and has spread worldwide. Ginger is divided into three types: red ginger, large white ginger, and small white ginger. Ginger contains essential oils, oleosin, and starch. Each ginger has a different volatile content, but red ginger has the most volatile content compared to large white ginger and small white ginger. The volatile content in ginger can be used as a medicine, one of which is hypertension. Soaking the feet

(body) in a warm solution such as red ginger water will improve circulation, reduce edema, and increase muscle circulation. Warm baths cause a systemic response through vasodilation (widening blood vessels) (5).

Physical activity is carried out by individuals when they are conscious and carried out regularly. Physical activity is a body movement produced by muscle movement that increases energy expenditure above the resting level and consists of routine daily tasks such as work, household activities, and other activities that aim to improve health. Physical activity indicates clean and healthy living behavior (6).

Walking, if done regularly and every day for 15-30 minutes without stopping, will make the body fresh and healthy. According to the Ministry of Health of the Republic of Indonesia, walking has many benefits, one of which is: Walking helps prevent heart disease and stroke by lowering blood pressure, Can calm the mind, Helps prevent Alzheimer's and senile dementia, Improves mental health, manages stress and keeps high levels of endorphins in the body, Increase muscle strength, Decrease body weight (7).

Previous research entitled effectiveness of giving warm ginger water foot soak therapy to reducing blood pressure in the elderly with hypertension at the Pucang Gading nursing home Semarang with the result that there was an effect of giving warm ginger water foot soak therapy to reducing blood pressure in elderly with hypertension. This study used a quasi-experimental method to provide ginger water therapy to reduce hypertension. While the difference is in the title, the author examines the relationship between soaking feet using red ginger water and physical activity. Other researchers are looking for the effectiveness of foot soaks using ginger. The difference between previous research and the author is that the author examines the relationship between foot soaking using red ginger water and physical activity in the title. Other researchers are looking for the effectiveness of foot soaking using ginger.

The urgency of the results of the study is that if hypertension is not treated, there will be calcification of the walls of the heart arteries which will reduce blood flow to some parts of the heart muscle. High blood pressure will force the muscles to work harder to pump blood

throughout the body; where this condition causes the heart muscle to thicken so that the pumping power of the heart muscle will decrease and will result in heart failure, vessel damage, kidney failure where the kidneys are no longer able to function correctly.

## **OBJECTIVE**

This study aims to determine the relationship between foot soaking using red ginger water and physical activity in decreasing blood pressure in Sakawayana Village.

## **METHODS**

### **Design**

This research is quasi-experimental design research using One Group Pretest-posttest. The location of this research is Sakawayana Village.

### **Sample, Sample size, and sampling technique**

This study's population is people with high blood pressure in Sakawayana Village RT.02/RW.01 Sampling was done by using purposive sampling. The number of samples in this study was 40 people. Inclusion Criteria: People who experience high blood pressure and people who are willing to be respondents. While the Exclusion Criteria: People who withdrew and were not present at the time of the study.

### **The instrument for data collection**

The data collection instrument in this study was to use a blood pressure meter, stethoscope, and the first observation sheet (pretest) to determine if there were any changes after the experiment. After the first observation, it was followed by intervention, then analyzed at the end, and a post-test was carried out. Flow chart of data collection process and intervention process:

### **Intervention**

The intervention applied in this study was soaking in red ginger water & physical activity. While the intervention components starting from the priority of the problem are Hypertension Patients, with the criterion of decreased blood pressure results, the interventions carried out are foot soak therapy using red ginger water and physical activity. The researchers first looked for samples of

Sakawayana villagers with blood pressure >140/90 using an observation sheet. When the sample has been fulfilled, then the researcher prepares the intervention to be carried out, namely soaking the feet using red ginger water and physical activity. The foot soak intervention using red ginger water lasts 15-20 minutes (8,9).

Preparation before carrying out the intervention 1). Prepare an observation sheet, 2). Measuring blood pressure, 3). Prepare the tools and materials that will be used for the intervention, 4). Measure blood pressure for the final result after soaking the feet using red ginger water and physical activity. As for physical activity, the researchers advised respondents to do aerobics or walk for 20 minutes (10,11).

### **Data analysis**

Univariate Analysis was used to describe between before and after being given foot soak therapy using red ginger water and physical activity.

A regression test was used to examine between dependent variable and independent variable. A regression test is carried out to determine which independent variables are related to the dependent variable and to determine the relationships' forms. Data is collected from one sample, meaning that one sample will have two data. The presence or absence of a significant relationship or correlation before and after the intervention can be determined in 2 ways: probability value based on the 95% significance level (alpha 0.05). P-value < (0.05), the null hypothesis is rejected, and the alternative hypothesis is accepted, meaning there is a relationship.

### **Ethical consideration**

This research has been approved by LPPM STIKes Muhammadiyah with No: 073/LPPM Mucis/VIII/2022.

## **RESULTS**

The table 1 shows the mean of systolic blood pressure before receiving the foot soak therapy using red ginger water was 153.9 mmHg. Whereas, the diastolic was 94 mmHg. The results indicated that the blood pressure

was significantly increased before and after implementing the physical activity therapy,

Table 1. Mean difference of Systolic and diastolic blood pressure before receiving foot soak using red ginger water and physical activity.

Variable	N	Mean	Min	Max
Soak the red ginger water				
Systole	4	159.5	140	180
Diastole	4	98.5	90	110
Physical Activity				
Systole	4	153.9	140	180
Diastole	40	94	80	100

Table 2. Mean difference in Systolic and diastolic blood pressure after receiving a foot soak using red ginger water and physical activity

Variable	N	Mean	Min	Max
Soak the red ginger water				
Systole	40	147.4	130	170
Diastole	40	90.5	80	100
Physical Activity				
Systole	40	147.4	130	170
Diastole	40	90.5	80	100

The table above shows that after physical activity therapy and soaking the feet using red ginger water, systolic blood pressure became 147.4 mmHg, and diastolic blood pressure became 90.5 mmHg.

Table 3. The relationship between physical activity and foot soak using red ginger water on blood pressure reduction.

No	Variable	R	R square	F	P value
1.	Systole	0.688	0.473	16.614	.000
2.	Diastole	0.675	0.456	15.512	.000

The table above shows the magnitude of the coefficient, or R = 0.688. This indicates a relationship between foot soaking with red

ginger water and physical activity on decreasing systolic blood pressure by 0.688 or 68.8% with a significant effect (R Square) of 0.473. The significant value of physical activity and foot soak using red ginger water to decrease systolic blood pressure is 0.000, and the F count is 16.614.

The table above shows the magnitude of the coefficient, or R = 0.675. This indicates a relationship between foot soaking with red ginger water and physical activity in reducing diastolic blood pressure by 0.675 or 67.5% with a significant effect (R Square) of 0.456. The significance value of physical activity and foot soak using red ginger water together to decrease diastolic blood pressure is 0.000, and the calculated F value is 15.512

## DISCUSSION

The results of this study indicate that blood pressure before being given foot soak therapy using red ginger water and physical activity, as seen in table 4.4, the average systolic blood pressure before foot soak therapy using red ginger water is 153.9 mmHg, diastolic 94 mmHg and before doing activities physical systolic blood pressure 159.5 mmHg, diastolic pressure 98.5 mmHg.

High blood pressure occurs because the heart is working harder. It will damage the walls of blood vessels. Patients with hypertension are at risk of having a stroke eight times greater and heart disease two times greater than people who do not have hypertension. Management needs to be carried out to reduce high blood pressure.

Management of hypertension can be done with pharmacological and non-pharmacological therapy. Pharmacological therapy is by using medical drugs, while non-pharmacological therapy is a therapy that is carried out without medical drugs, such as doing physical activity and soaking the feet using red ginger water.

This is in line with research conducted by Nadia in 2020 (12), which states that ginger is efficacious for treating hypertension because it contains gingerol, which can warm the body. A study (10) also indicated that ginger could be used as a therapy for various diseases that can be combined with other ingredients or warm water.

A study from Risal on physical activity (14) states that physical activity is beneficial for reducing the risk of heart disease, obesity, and high blood pressure. A previous study (10) says physical activity lowers blood pressure in someone with mild to moderate hypertension.

The volatile content and gingerols in red ginger cause changes in blood pressure that occur before and after the intervention. Physical activity is carried out regularly, which can make blood vessels and muscles relax so that blood flow becomes smooth and there is a decrease in blood pressure.

A study (15) stated that giving ginger water soak therapy had an effect on reducing blood pressure. Another study (16) said that a lack of physical activity would stagnate the supply of blood and oxygen, increasing blood pressure, meaning that physical activity can affect decreasing blood pressure and its stability.

The results of this study indicate that the p-value of foot soaking using red ginger water and physical activity together to decrease systolic blood pressure is  $0.000 < 0.05$ . Meanwhile, the diastolic blood pressure is  $0.000 < 0.05$ .

Research conducted by Arinda 2019 (17) also stated that there was an effect of soaking the feet with red ginger water on decreasing blood pressure, with a p-value of 0.000 for systolic pressure and 0.001 for diastolic pressure.

This is also in line with a previous study (15) regarding the effectiveness of giving warm ginger foot bath therapy to reduce blood pressure in the elderly with hypertension at the Pucang Gading nursing home in Semarang. The study found the average blood pressure results. Systolic and diastolic before the intervention was 153.35/97.06 mmHg, and after being given the intervention, it was 140.12/84.88 mmHg. It was concluded that foot soak therapy with warm ginger water reduces blood pressure and can be a cheap, safe, and easy therapy.

In this study, respondents often complained that the muscles felt tense before doing a foot soak therapy using red ginger water. After receiving a foot soak using red ginger water, respondents stated they felt more relaxed, and the muscles were not too tense. This is also in line with studies (18-19) showed

that progressive muscle relaxation affects blood pressure reduction in elderly patients with hypertension with audio-visual media.

Red ginger is one of the herbal ingredients that contain many benefits. The volatile content in red ginger, which is more than other ginger, gives red ginger a sharper taste and aroma. In addition to cooking, red ginger can also be used as a medicine for various diseases, one of which is blood pressure. The volatile content and gingerol in red ginger can warm the body so that when soaking the feet using red ginger water, the blood vessels will widen, relax the muscles, smooth blood flow, and lower blood pressure.

According to Nurahmandani (15), warm ginger foot soak therapy on reducing blood pressure was stated that soaking the feet in warm ginger water six times can lower blood pressure.

The results of research conducted by Nurpratiwi (19) also stated that the most effective time to do a foot soak with ginger water is in the morning because the time in the morning, the blood vessels have not been smooth, but after being given a foot soak therapy using ginger water for 10-20 minutes with the water level just ankles making blood vessels smooth.

This is in line with research conducted by sitohang 2020 (20), which states that there is no significant relationship between physical activity and systolic blood pressure, but there is a significant relationship between physical activity and diastolic blood pressure. Research conducted by Aziz 2019 (21) also stated that physical activity can cause a decrease in blood pressure, and (16) says that there is a relationship between physical activity and blood pressure in people with hypertension in the Tlongosuryo area.

Patients with hypertension are recommended to maintain a healthy lifestyle by performing physical activity, reducing salt consumption, reducing caffeine consumption, not smoking, and avoiding stress. Physical activity has many health benefits, including maintaining ideal body weight, losing weight for people with obesity or overweight, reducing stress, maintaining physical fitness, making sleep more comfortable, relaxing muscles, and improving blood flow. Blocked blood flow will

cause the heart to work excessively so that there will be an increase in blood pressure (22)

Prasetyo (23) stated that aerobic exercise has significantly lower blood pressure than moderate intensity, such as brisk walking. Brisk walking is done for 20-60 minutes with a frequency of 3-4 times a week. Walking or jogging for 16 weeks will lower blood pressure because the noradrenaline hormone will decrease blood pressure in the body.

Aziz's research in 2019(21) also stated that moderate-intensity aerobic exercise was the most effective physical activity for lowering blood pressure. Aerobic exercise with moderate intensity to lower blood pressure is not only done in the long term but can also lower blood pressure simultaneously.

The content of gingerol in red ginger, which makes a warm feeling, will be absorbed by the pores so that the gingerol substance will enter the blood vessels and make blood flow smoother, just like regular physical activity will make the blood vessels elastic and blood flow becomes smoother smoothly so that blood pressure will decrease.

Foot soak therapy in warm water can change someone's life and lead to a healthy life. While doing warm water, foot soak therapy can be done anytime. The effect of soaking feet in warm water is the same as walking with bare feet for about 20 minutes, which aims to improve blood circulation. Soaking feet in warm water significantly impacts the body and blood vessels so that blood circulation runs smoothly. Thus warm water can also positively affect the body against the heart and lung muscles.

Based on the working principle of this warm water foot soak therapy, namely with a temperature of 38-40°C carried out for 20-30 minutes where there is a transfer between warm water into the body so that blood vessels dilate and can reduce tension in the muscles (24,25). Studies also show that foot soak therapy with warm ginger water has an effect on lowering blood pressure and can be one of the therapies that are cheap, safe, and easy to do (26-27).

## CONCLUSION

In conclusion confirmed the foot soaking using red ginger water and physical activity was effective to improve the blood pressure

level. It was effective as alternative therapy among hypertension patients.

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