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Original Research

Improving Sleep Quality and Blood Pressure Through Warm Foot Soak in the Elderly

Cahya Mulya[1*], Dwi Sulistyowati[2], Athanasia Budi Astuti[3]

[1] D-IV Nursing Student, Poltekkes Kemenkes Surakarta, Indonesia
[2,3] Department of Nursing, Poltekkes Kemenkes Surakarta, Indonesia

ABSTRACT

Background: *Hypertension can lead to decreased sleep quality in the elderly. Nursing interventions are needed to overcome sleep disorders in the elderly. This study analyses the effect of warm water foot bath therapy on reducing blood pressure and improving sleep quality in elderly people with hypertension who experience sleep disorders.*

Methods: *Pre-experimental research with one group pre-post test design method. The purposive sampling technique was 37 respondents. Research instrument questionnaire sheet. Friedman statistical test.*

Results: *Friedman test results p value < 0.001. Sleep quality before warm water soaking results in moderate PSQI scores (37.8%) and respondents with poor PSQI scores (62.2%). After the warm water soak, the PSQI score was good (8.1%), respondents with mild PSQI scores (18.9%) and respondents with moderate PSQI scores (73%). Friedman test p value <0.001.*

Conclusion: *Warm water foot baths can reduce blood pressure and improve sleep quality in the elderly. This therapy can be used as a nursing intervention in the elderly who experience hypertension and sleep disorders.*

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CONTACT
Cahya Mulya
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cahyamulyapolkesta@gmail.com
D-IV Nursing Student, Poltekkes Kemenkes Surakarta, Jln. Letjen Sutoyo, Mojosongo, Surakarta, Indonesia.

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INTRODUCTION

According to the World Health Organisation (WHO), an elderly person is someone aged 60 years and above. Elderly is the age classification of a person who has faced the final stage of a phase of life. Groups that are classified as older will experience a cycle called the aging process (Utami & Putri, 2023). According to the Ministry of Health or Kemenkes RI (2019), Indonesia is entering a period of aging population, where there will be an increase in life expectancy followed by an increase in the number of elderly people. In Indonesia, there was an increase in the number of elderly people from 18 million people (7.56%) in 2010, to 25.9 million people (9.7%) in 2019, and it is estimated that it will continue to increase in 2035 where it will be 48.2 million people (15.77%) (Badan Penelitian dan Pengembangan Kesehatan, 2019b).

According to the Basic Health Research or Riskesdas (2018), the most common diseases suffered by the elderly are non-communicable diseases, one of which is hypertension (Ministry of Health of the Republic of Indonesia, 2018). WHO data shows that around 1.13 billion people in the world have hypertension, meaning that 1 in 3 people in the world is diagnosed with hypertension. In Indonesia, the number of hypertension cases is 63.309.620 people, while the death rate in Indonesia due to hypertension is 427.218 deaths (Ministry of Health of the Republic of Indonesia, 2018).

The Central Java Health Profile shows that the prevalence of hypertension in Central Java is 17.74%, while the prevalence of hypertension in the Boyolali region alone is 11.82%. Data from the Boyolali District Health Profile shows that hypertension ranks first in the proportion of non-communicable disease cases in Central Java with 13,702 cases. Nogosari Health Centre as the research site has a high prevalence of hypertension. Based on blood pressure measurements of the population over the age of 18 years, Nogosari Health Centre has the sixth highest number of hypertensive patients out of 29 Health Centres in Boyolali Regency, namely 9555 residents of Boyolali Regency Health Profile (Badan Penelitian dan Pengembangan Kesehatan, 2019a).

Pathological processes such as hypertension can trigger changes in sleep patterns. Sleep disorders can impact 50% of people aged 65 years or older. Poor sleep quality can affect the increase in blood pressure (Riyani et al., 2022). Hypertension is caused by an increase in hormone cortisol. If blood pressure remains high, it can reduce hormone secretion, namely the secretion of the hormone serotonin into the hormone melatonin which can cause relaxation and drowsiness. Inadequate sleep quality in the elderly can damage memory and cognitive abilities.

If this continues for years, it can lead to high blood pressure, heart attack, stroke and psychological problems such as depression and other disorders (Fadlilah et al., 2020). Management to treat hypertension with sleep disorders consists of 2 types, namely pharmacological management and non-pharmacological management (Dareda et al., 2023). Foot bath therapy is one of the non-pharmacological treatments. This therapy uses warm water which causes changes in blood pressure. Foot bath therapy has an impact on vasodilatation of blood vessels as the effect of heat energy generated from warm water baths (Sapto Pramono et al., 2021; Surahmi, 2022).

This makes blood circulation smooth and creates a feeling of relaxation, reduces soreness, and stiffness, so that it can improve sleep quality. This study offers a novel contribution by examining the dual effect of warm foot bath therapy on both blood pressure reduction and sleep quality improvement in elderly individuals with hypertension. Unlike previous studies that focused solely on physiological outcomes, this research highlights the integrative benefit of a simple, non-pharmacological intervention on both cardiovascular and sleep health.

The results of preliminary studies at Posyandu Ngudi Waras found data that out of 54 elderly people there were 37 (68.5%) elderly people who experienced hypertension with sleep disorders. The results of interviews with cadre administrators found that elderly people suffering from hypertension complained of frequent dizziness and difficulty sleeping. Efforts made to overcome the high blood pressure of the elderly in the posyandu are maintaining a healthy lifestyle such as a salt-soaked diet, maintaining diet and exercise.

These efforts have not optimally overcome the problem of hypertension, so nursing interventions such as foot bath therapy are needed. This study aims to analyse

the effect of warm water foot bath therapy on reducing blood pressure and improving sleep quality in elderly people with hypertension.

MATERIALS AND METHOD

This study used a pre-experimental research design with a one group pretest-postest method on 37 elderly people. The sampling technique used was purposive sampling technique. The inclusion criteria in this study include: (1) Patients with mild hypertension who have systolic blood pressure more than 140 mmHg and diastolic pressure more than 90 mmHg; (2) Patients with hypertension aged 60-90 years; 3) Composmentis consciousness; (4) Do not have dependence in carrying out daily activities; (5) Do not consume sleeping pills.

The exclusion criteria for this study include: (1) Patients with secondary hypertension who already have complications of diseases such as stroke, DM, heart disease, and kidney failure; (2) Patients who refuse or are uncooperative; (3) Elderly who have fractures, burns, redness of the skin of the feet, or open wounds in the foot area; (4) Elderly who follow alternative treatments such as massage or others such as acupuncture.

The procedure for performing warm water soak therapy includes mixing cold water and hot water with a temperature of 39-42^{o}C. The elderly then soaked their feet up to the calves for 10 minutes. The researcher then takes temperature measurements every 5 minutes, if the temperature drops add hot water until the temperature is appropriate again. After 10 minutes, the elderly then dried their feet with a towel.

Blood pressure was measured using a digital blood pressure meter brand "Omron". Sleep quality was measured with a questionnaire sheet consisting of personal data and PSQI, adapted from Dr Sari Theresia Bukit which consists of 7 question components. Each component has an alternative answer 0-3. The lowest score is 0, the highest score is 21, the higher the score the worse the sleep quality.

The PSQI has an internal reliability of 0.83 and for repeated measurement's global internal reliability is 0.85. Diagnostic sensitivity was 89.6% and specificity was 86.5% (Kappa = 0.75; p value <0.001) (Dahlan, 2021; Polit & Beck, 2018). The statistical test used was a non-parametric test (Friedman test) because the data was ordinal. This study has obtained ethical eligibility from the Health Research Ethics Commission of the Surakarta Poltekkes Kemenkes with number LB.02.02/1.1/693.8/2021 dated 14 March 2022.

RESULTS

Table 1. Elderly Characteristics by Age and Gender (n = 37 people)

Variable	Distribution	
	n	**%**
Age		
60-74 years	33	89.2
75-89 years	4	10.8
Over 90 years	0	0
Total	**37**	**100**
Gender		
Male	2	5.4
Female	35	94.6
Total	**37**	**100**

Description: n = number; % = percentage

Table 1. Describes the characteristics of research subjects based on age and gender. The characteristics of research subjects based on age were mostly in the 60-74 years category with a percentage of 89.2%. The characteristics of research subjects based on gender were mostly female with a percentage of 94.6%.

Table 2. Effect of Foot Soak Therapy with Warm Water on BloodPressure Reduction in Elderly People with Hypertension (n = 37 people)

Variable	*Pre Test*		*Post Test*		**p value*
	n	**%**	**n**	**%**	
Grade I Hypertension (140/90-159/99 mmHg)	18	48.6	29	78.4	**< 0.001**
Grade II Hypertension (160/100-179/109 mmHg)	16	43.2	7	18,9	
Grade III Hypertension (180/110-209/119 mmHg)	3	8.1	1	2,7	
Total	**37**	**100**	**37**	**100**	

Note: n = number; % = percentage; *Friedman test

Table 2. describes the effect of foot soak therapy with warm water on lowering blood pressure in elderly people with hypertension. The percentage of elderly people with grade I hypertension after warm water foot soaking increased from 48.6% to 78.4%. The percentage of elderly with grade II hypertension decreased from 43.2% to 18.9%; while the percentage of elderly with grade III hypertension also decreased from 8.1% to 2.7%. The results of statistical tests with Friedman showed that there was a significant effect before and after warm water footbath therapy on lowering blood pressure in the elderly (*p value* < 0.001).

Table 3. Effect of Foot Soak Therapy with Warm Water on Sleep Quality in Elderly People with Hypertension (n = 37 people)

Variable	*Pre Test*		*Post Test*		**p value*
	n	**%**	**n**	**%**	
Good	0	0	3	8.1	**< 0.001**
Lightweight	0	0	7	18.9	
Medium	14	37.8	27	73	
Bad	23	62.2	0	0	
Total	**37**	**100**	**37**	**100**	

Note: n = number; % = percentage; *Friedman test

Table 3. describes the effect of warm water foot bath therapy on sleep quality in elderly people with hypertension**.** In the elderly with poor sleep quality, the percentage decreased after foot soak therapy with warm water from 62.2% to 0%. In the elderly with moderate sleep quality increased from 37.8% to 73%; while in the mild and good categories there was an increase of 18.9% and 8.1%. The results of the statistical test with Friedman showed that there was a significant effect before and after warm water foot bath therapy on sleep quality in the elderly (p value < 0.001).

DISCUSSION

Effect of Warm Water Foot Soak Therapy on Blood Pressure Reduction

The results showed that there was an effect of foot soak therapy with warm water with a decrease in blood pressure. There is an effect of foot soak on lowering blood pressure. Warm water is one of the therapeutic media that can prevent and restore a person from high blood pressure. This is due to the hydrostatic, hydrodynamic, and warm temperature effects that facilitate blood circulation in the body. The hydrostatic pressure that water exerts on the body causes blood to flow from the feet to the chest cavity, so that blood will accumulate in the large blood vessels of the heart (Surahmi, 2022).

Warm water will trigger dilation of blood vessels and increase heart rate. The biological effects of heat or warmth can dilate blood vessels resulting in increased blood circulation. This warm water reaction is used for therapeutic purposes in various conditions and conditions in the body. Soaking feet with warm water can dilate blood vessels and increase blood circulation. This can relax the whole body and reduce fatigue and daily activities (Fadlilah et al., 2020).

Effect of Warm Water Foot Soak on Quality

There is an effect of foot soaking with warm water on elderly hypertension who experience sleep disorders. Foot soaking therapy with warm water affects sleep quality (Kudo & Sasaki, 2020). This is due to the feeling of relaxation and the release of the hormone serotonin. Scientifically, soaking feet with warm water has a physiological effect on a person's body.

Warm water will cause dilatation of blood vessels, decrease blood viscosity, reduce muscle tension, increase tissue metabolism, increase permeability and provide a relaxing effect. The effect of soaking feet with warm water can relieve stress. The benefits of foot bath therapy with warm water create a feeling of relaxation, stimulate nerve endings to create a feeling of refreshment, improve blood circulation, increase tissue metabolism, decrease muscle tone stiffness (Afrasiabifar et al., 2022; Afriannisyah et al., 2024; Suryati & Solihat, 2022).

This study proves that warm water foot bath therapy can serve as an independent nursing intervention within community health settings to reduce blood pressure and improve sleep quality in elderly individuals with hypertension. Community nurses can implement this simple, low-cost intervention as part of routine elderly care programs, especially during home visits or at community health posts (posyandu lansia), to promote non-pharmacological management of hypertension. This study has limitations including researchers not controlling confounding variables such as salt consumption, daily activities, and psychological conditions of the elderly. Future research is expected to control these confounding variables and control group.

CONCLUSION

Foot soaking therapy with warm water can lower blood pressure in elderly individuals with hypertension. Furthermore, this therapy has also been shown to improve sleep quality in the elderly. This therapy is safe and can be easily performed independently. Therefore, it can serve as a practical nursing intervention, particularly for elderly patients experiencing hypertension and sleep disturbances. This therapy may be considered as an alternative non-pharmacological intervention.

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