THE EFFECT OF HYDROTHERAPY ON LOWERING BLOOD PRESSURE AMONG HYPERTENSION

Jessyca Cindy Lontoh[1], Frendy Fernando Pitoy[1,2]*
[1]Faculty of Nursing, Universitas Klabat, Jl. Arnold Mononutu, Airmadidi Bawah, Airmadidi, Minahasa Utara, Sulawesi Utara 95371, Indonesia
[2]School of Advanced Studies, Saint Louis University, Baguio City, Philippines
*frendypitoy@unklab.ac.id

ABSTRACT

Hypertension is a cardiovascular disease and a non-communicable disease that poses a significant health risk due to its high mortality rate. It can lead to various health complications, including stroke, aneurysm, heart failure, heart attack, and kidney damage. Complementary therapies, when utilized traditionally, can assist in the management of hypertension. Examples of such therapies include warm water hydrotherapy and other water-based treatments. This study aimed to determine the impact of warm water foot-soak hydrotherapy on reducing blood pressure in hypertensive patients within the Airmadidi Health Center working Area. This research is a quantitative study that utilizes a quasi-experimental method with an equivalent control group design. The research sample was obtained through a non-probability sampling technique, specifically purposive sampling, which resulted in 40 participants divided into 20 in the control group and 20 in the intervention group. The intervention group administered warm water foot-soak hydrotherapy for a period of six consecutive days, with each session lasting 30 minutes and the water maintained at a temperature of 40°C. The statistical analysis employed was a bivariate analysis with the Mann-Whitney test. The results showed a significant difference in blood pressure values before and after hydrotherapy, with p-value = 0.000 for systolic and p-value = 0.000 for diastolic. Furthermore, the data shows a difference in the mean value of systolic blood pressure between the control group and the treatment group of 41.05 mmHg. In comparison, diastolic blood pressure values show a difference in the mean value of 35.35 mmHg. It is hoped that the community, especially people with hypertension, can use warm water foot bath hydrotherapy as a complementary therapy that can be done independently to help reduce blood pressure.

Keywords: blood pressure; hydrotherapy; hypertension; warm water

INTRODUCTION

Cardiovascular disease, or diseases of the heart and blood vessels, is classified as a non-communicable but deadly disease. This disease has such a high mortality rate that it has earned the number one killer in the world. Cardiovascular diseases that can occur include heart failure, congenital heart disease, coronary arteries, peripheral arteries, hypotension, and hypertension. (Warganegara & Nur, 2016). High blood pressure or hypertension is one of the problems caused by cardiovascular diseases. Menurut Kementerian Kesehatan Republik Indonesia (Kemenkes RI) (2016) hypertension occurs due to increased blood pressure in arterial blood vessels and is asymptomatic. These events can cause the risk of stroke, aneurysm, heart failure, heart attack, and kidney damage. Hypertension itself can be categorized as high blood pressure if, at the time of examination, the pressure reaches more than or equal to 140 mmHg in systolic and more than or equal to 90 mmHg in diastolic. (World Health Organization (WHO), 2021).

The global prevalence of hypertension has escalated to a significant public health concern. Menurut WHO (2021) According to WHO (2021), the incidence of hypertension in the world has grown from 594 million in 1975 to 1.13 billion in 2015, particularly among adults. The African region has been particularly hard hit, with a 27% incidence rate. The American region exhibits the lowest rate of hypertension, with 18% of the population affected. In Indonesia, data from RISKESDAS (2018a) indicates that 34.11% of the population is hypertensive, categorizing this condition as a

non-communicable disease. The North Sulawesi region exhibits a 33.12% prevalence of hypertension, with the North Minahasa district demonstrating a 23.03% prevalence. North Minahasa is the seventh district in North Sulawesi, with the highest number of hypertensive patients (RISKESDAS, 2018b).

Hypertension has become a significant public health concern, characterized by persistent elevated blood pressure levels. Hypertension can lead to severe health complications, including death. Therefore, it is imperative to monitor the signs and symptoms associated with hypertension closely. A recommended course of action is to undertake regular blood pressure checks. The symptoms associated with hypertension can include dizziness, tachycardia, dyspnea, and visual impairments such as blurred or double vision (Marliani, 2013).

The management of hypertension and its associated symptoms has been approached through various methodologies, particularly within the healthcare sector. Treatment regimens encompass a wide spectrum, ranging from pharmacological interventions that utilize pharmaceuticals to traditional or non-pharmacological approaches such as complementary therapies. Among the public, complementary treatment with traditional methods has garnered particular popularity due to its affordability, as evidenced by the prevalence of herbal medicines and hydrotherapy, which involves soaking feet in warm water. (Prakosa, 2022). Hydrotherapy, which involves soaking the feet in warm water, has been demonstrated to offer many benefits and physiological effects on the human body. The benefits that can be obtained from warm water foot-soak hydrotherapy include increased body temperature, relieved and calmed muscles, increased immunity, and skin detoxification. Furthermore, the practice has been shown to stabilize blood pressure by dilating blood vessels and lowering heart rate, thereby reducing the risk of hypertension. (Ilkafah, 2016).

Implementing non-pharmacological therapeutic interventions, such as hydrotherapy, is both straightforward and efficacious in reducing blood pressure. This modality is endorsed due to its simplicity and accessibility, negating the necessity for specialized skills or expertise. The absence of specialized equipment and materials makes this modality accessible to a broad population of hypertensive patients. The treatment is administered for approximately 15 minutes daily (Santoso DA, 2015). The application of hydrotherapy is easy to do by anyone because the equipment and materials used are very easy to reach. The tools and materials used are only water and containers, by inserting the feet into a container filled with water, especially warm water. This action will be a therapy that can help lower blood pressure (Letlora, 2018).

Several studies have been conducted and shown a positive effect of warm water foot-soaks hydrotherapy on blood pressure reduction. The results of a study conducted by Susanti dan Damayanti (2022) on the effect of warm water foot soak hydrotherapy on blood pressure in the elderly in Palembang showed that warm water foot-soaks with a duration of 15 minutes for 6 consecutive days can reduce blood pressure by 10 mmHg. Then the results of research from Oktavianti dan Dwi (2022) A significant effect of administering warm water therapy on reducing blood pressure levels was identified in hypertensive patients in Paninggilan, Ciledug-Tangerang. The mean difference in blood pressure before and after the intervention was found to be 12.5 mmHg. However, it is important to note that this finding is not universally applicable, as other studies have reported conflicting results by Masi dan Rottie (2017) which indicated that warm water foot baths were ineffective in reducing blood pressure in patients with hypertension at the

Bahu Manado health center. The observed discrepancy in outcomes can be attributed to the duration of the therapeutic intervention, which was administered only six times. This limited the extent of the observed decrease in blood pressure among all participants. Among participants who demonstrated a decrease in blood pressure, the observed reduction was a mere 8 mmHg.

Researchers obtained several facts from health workers at the Airmadidi Health Center and from the results of community field practice. The officer stated that the incidence rate of hypertension in the working area of Airmadidi Health Center was significantly high in comparison to other chronic diseases, with a total of 2243 patients diagnosed with hypertension in 2022. Based on the results of a field survey conducted in April-May 2023, there were a total of 160 patients with hypertension. In light of the aforementioned background and facts, the researcher is interested in conducting a study that aims to determine the effect of the application of warm water foot-soak hydrotherapy on lowering blood pressure in hypertensive patients in the working area of the Airmadidi Health Center.

METHOD

This study employs a quantitative approach, utilizing a quasi-experimental research design with an equivalent control group. The sampling technique used in this study was nonprobability sampling with purposive sampling, specifically targeting hypertensive patients residing in the Upper Airmadidi village within the Airmadidi Health Center's service area who have been diagnosed with chronic hypertension, who maintain regular medication schedules, and who are not late in taking their prescribed medications. The sample size was determined by adapting it from Roscoe (1982) in Sugiyono (2017), who suggested in the context of experimental research involving treatment groups and control groups, the optimal sample size is between 10 and 20 participants per group. The number of samples utilized in this study was derived from this recommendation, amounting to 40 samples. Within each group, the number of samples is set at 20. The present study utilizes a variety of instruments. These instruments include observation sheets, aneroid sphygmomanometers, stethoscopes, and water thermometers. The observation sheet contains a format comprising participant code, age, and blood pressure before and after administering warm water foot-soaks hydrotherapy. The aneroid sphygmomanometer and stethoscope were utilized to assess blood pressure before and after the intervention, while the water thermometer was employed to measure the water temperature. The participant's blood pressure was classified according to the criteria outlined in Table 1.

Tabel 1
Classification of Blood Pressure in Patients with Hypertension

Classification	Sistolik (mmHg)	Diastolik (mmHg)
Hipotensi	< 90	< 60
Normal	< 120	< 80
Pre-Hipertensi	120-139	80-89
Hipertensi stage 1	140-159	90-99
Hipertensi stage 2	≥ 160	≥ 100

Sources: (Joint National Committee-VII, 2003; Tritapepe et al., 2013)

The present study employed data analysis to address univariate issues concerning blood pressure in hypertensive patients within the operational domain of the Airmadidi health center, encompassing both the control group and the treatment group. The mean (average) and standard deviation formulas were utilized to this end. The investigation then sought to address bivariate

issues concerning variations in blood pressure subsequent to the administration of warm water foot soaks as a form of hydrotherapy. To this end, the Mann-Whitney test was employed, given the non-normal distribution of the data. The normality test was conducted using the Saphiro Wilk analysis technique, given that the subject was ≤50 and the results of the significance value were found to be 0.004 (≤ 0.05). This suggests that the data was not normally distributed. Subsequent to the normality test, the data underwent analysis using the Statistical Program for Social Science (SPSS) Windows version 25.

The research data collection process was conducted from January 2024 to March 2024. Data collection was executed through direct visits to participants' residences, with a rotational approach employed to ensure representativeness within the study sample. Participants receiving therapeutic interventions were administered warm water foot bath therapy for a duration of 30 minutes at a temperature of 40°C. This therapeutic modality was administered for a period of six days, occurring in the morning, and blood pressure measurements were obtained on the first day prior to the initiation of therapy and on the final day following the completion of the 30-minute therapy session.

RESULT AND DISCUSSION

The results of the data analysis concerning the blood pressure values of hypertensive patients in the Airmadidi Health Center working area are presented in the following tables.

Table 2.
Control Group Blood Pressure Values

Test	Blood Pressure	N	Min	Max	Mean	SD	Mean + SD	Mean - SD	Classification
Pre	Systolic	20	130	155	144,20	7,696	151,896	136,504	Hypertension stage 1
	Diastolic	20	90	110	96,45	5,942	102,392	90,508	Hypertension stage 1
Post	Systolic	20	140	155	146,35	4,428	150,778	141,922	Hypertension stage 1
	Diastolic	20	85	110	94,20	5,588	99,788	88,612	Hypertension stage 1
	Total	20							

Table 2 presents the mean and standard deviation of the control group's pre-test and post-test systolic and diastolic blood pressure. Before the intervention, the systolic blood pressure registered at 144.2 mmHg ± SD =7.696. Similarly, the diastolic blood pressure was recorded at 96.4 mmHg ± SD = 5.942. The results indicate that the blood pressure levels in the control group at the pre-test stage fall within the category designated as stage 1 hypertension. The data further revealed that the maximum systolic blood pressure recorded in the pre-test was 151.8 mmHg, while the minimum was 136.5 mmHg. Similarly, the highest recorded diastolic blood pressure in the pre-test was 102.3 mmHg, while the lowest was 90.5 mmHg.

In addition, post-test results indicated an average systolic blood pressure of 146.3 mmHg ± SD = 4.428 and an average diastolic blood pressure of 94.2 mmHg ± SD = 5.588. The mean blood pressure in the control group at the post-test was 146.3/94.2 mmHg, indicating that the blood pressure in the control group at the post-test was in the stage 1 hypertension category. The highest systolic blood pressure value recorded at the post-test stage was 150.7 mmHg, while the lowest was 141.9 mmHg. Similarly, the highest recorded diastolic blood pressure at the post-test phase was 99.7 mmHg, while the lowest was 88.6 mmHg.

Table 3
Intervention Group Blood Pressure Values

Test	Blood Pressure	N	Min	Max	Mean	SD	Mean + SD	Mean - SD	Classification
Pre	Systolic	20	140	170	158,30	8,957	167,257	149,343	Hypertension stage 1
	Diastolic	20	95	135	116,50	10,144	126,644	106,356	Hypertension stage 2
Post	Systolic	20	110	125	119,40	3,455	122,855	115,945	Normal
	Diastolic	20	70	85	78,90	4,352	83,252	74,548	Normal

As illustrated in table 3, the mean blood pressure levels of the intervention group were as follows: systolic pressure of 158.3 mmHg ± SD = 8.957, and diastolic pressure of 116.5 mmHg ± SD = 10.144. The mean blood pressure levels in the intervention group at the pre-test were determined to be 158.3/116.5 mmHg, classified as stage 2 hypertension. The highest systolic blood pressure value recorded in the pre-test was 167.2 mmHg, while the lowest was 149.3 mmHg. Similarly, the highest recorded diastolic blood pressure in the pre-test was 126.6 mmHg, while the lowest was 106.3 mmHg. In addition, the post-test results indicated that systolic blood pressure registered at 119.4 mmHg ± SD = 3.455, while diastolic pressure was 78.9 mmHg ± SD = 4.352. Consequently, it can be concluded that the blood pressure in the intervention group at the post-test was 119.4/78.9 mmHg and can be classified as normal. The highest systolic blood pressure recorded at the post-test was 122.8 mmHg, while the lowest was 115.9 mmHg. Similarly, the highest diastolic blood pressure recorded at the post-test phase was 83.2 mmHg, while the lowest was 74.5 mmHg.

Table 4
Mann-Whitney Analysis of the Effect of Hydrotherapy on Blood Pressure

	Mean Difference between Control and Intervention group	Asymp. Sig. (2-tailed)	Interpretation
Systolic	41,05	0,000	Significant
Diastolic	35,35	0,000	Significant

The analysis results in table 4 demonstrate the significance of comparing the mean values of systolic and diastolic blood pressure between the control and intervention groups. The findings reveal that the p-value is less than 0.05 for measurements of systolic and diastolic blood pressure. These findings indicate a substantial variation in blood pressure values, both systolic and diastolic, before and following hydrotherapy interventions. Consequently, it can be concluded that warm water foot-soaks hydrotherapy significantly affects systolic and diastolic blood pressure values in hypertensive patients within the working area of the Airmadidi Health Center.

The analysis results in Table 4 demonstrate the statistical significance of comparing mean systolic and diastolic blood pressure values between the control and intervention groups. The findings revealed a substantial discrepancy in blood pressure values between the control and treatment groups, both systolic and diastolic, both before and after hydrotherapy. The data further demonstrated that the mean systolic blood pressure value differed between the control and treatment groups by 41.05 mmHg, while the mean diastolic blood pressure value differed by 35.35 mmHg.

The utilization of hydrotherapy has emerged as a promising non-pharmacological approach to addressing hypertension. The regular application of hydrotherapy has been shown to enhance blood circulation by inducing vasodilation, thereby reducing blood pressure by stimulating and activating sympathetic nerves and maintaining blood pressure within healthy parameters (Asan et al., 2016). Hydrotherapy has been demonstrated to facilitate the relaxation of muscles and connective tissues, thereby inducing a calming effect, reducing pain, and enhancing blood circulation within the body (Pereira & Sebastian, 2018).

The findings of this study are consistent with those of prior research. Research by Letlora (2018) indicated that hydrotherapy is a highly effective intervention for reducing blood pressure. The study yielded a p-value of $0.000 \leq 0.05$, indicating the efficacy of warm water foot-soaks on blood pressure in hypertensive patients at Elderly Social Service Center. Similar results were also found by Arafah (2019), and Dilianti et al. (2017) found that the p-value is $0.000 \leq 0.05$, indicating a statistically significant relationship between hydrotherapy and blood pressure in hypertensive patients. The findings of this study indicate that warm water foot soaks, a component of hydrotherapy, can contribute to the reduction of blood pressure and the management of blood pressure levels in hypertensive patients, thereby averting the occurrence of subsequent complications. This suggests that hydrotherapy, in the form of complementary therapy, holds potential as a treatment option for hypertensive patients seeking to manage their blood pressure.

CONCLUSION

The results concluded that there was a significant effect between warm water foot-soak hydrotherapy on systolic and diastolic blood pressure in hypertensive patients in the Airmadidi Health Center working area. It was found that after receiving treatment, participants whose average blood pressure was in stage 1 hypertension category became normal. Participants who did not get treatment were in the same blood pressure category, namely stage 1 hypertension, at the time of the first and second measurements.

REFERENCES

Arafah, S. (2019). *Pengaruh rendam kaki dengan menggunakan air hangat terhadap penurunan tekanan darah pada hipertensi di wilayah kerja Puskesmas Pattallassang Kabupaten Takalar*.

Asan, Y., Sambriong, M., & Gatum, A. M. (2016). *Perbedaan tekanan darah sebelum dan sesudah terapi rendam kaki air hangat pada lansia di Upt Panti Sosial Penyantunan Lanjut Usia Budi Agung Kupang*. *11*(2), 37–42.

Dilianti, I. E., Candrawati, E., & Adi, R. C. (2017). Efektivitas hidroterapi terhadap penurunan tekanan darah pada lansia penderita hipertensi di panti wreda Al-Islah Malang. *Nursing News*.

Ilkafah. (2016). Perbedaan penurunan tekanan darah lansia dengan obat anti hipertensi dan terapi rendam air hangat di wilayah kerja Puskesmas Antara Tamalanrea Makassar. *Pharmacon Jurnal Ilmiah Farmasi*, *5*(2). https://doi.org/https://doi.org/10.35799/pha.5.2016.12194

Kementerian Kesehatan Republik Indonesia. (2016). *Tekanan darah tinggi (Hipertensi)*. Kementerian Kesehatan Republik Indonesia.

Letlora, M. C. (2018). *Pengaruh rendam kaki air hangat terhadap tekanan darah pada penderita hipertensi di Balai Pelayanan Sosial Lanjut Usia Senja Cerah Paniki*.

Marliani, L. (2013). *100 question & answers Hipertensi*. Elex Media Komputindo.

Masi, G. N. M., & Rottie, J. V. (2017). Pengaruh terapi rendam kaki dengan air hangat terhadap penurunan tekanan darah pada pasien dengan hipertensi di puskesmas bahu Manado. *Ejournal Keperawatan (e-Kp)*, *5*(1).

Oktavianti, D. S., & Dwi, P. (2022). Penurunan tekanan darah dengan penerapan terapi rendam kaki air hangat pada hipertensi. *Madago Nursing Journal*, *3*(1). https://doi.org/10.33860/mnj.v3i1.1225

Pereira, A. C., & Sebastian, S. (2018). Effectiveness of hot water foot bath therapy in reduction of temperature among children (6-12 years) with fever in selected hospitals at Mangaluru. *International Journal of Applied Research*.

Prakosa, R. A. (2022). *Efektifitas terapi rendam kaki hidroterapi air hangat dalam menurunkan tekanan darah pada penderita hipertensi*.

Riskesdas. (2018a). *Laporan nasional RISKESDAS 2018*. Kementerian Kesehatan Republik Indonesia.

Riskesdas. (2018b). *Laporan RISKESDAS Sulawesi Utara 2018*. Kementerian Kesehatan Republik Indonesia.

Santoso DA. (2015). Pengaruh terapi rendam kaki air hangat terhadap penurunan tekanan darah pada lansia penderita hipertensi di wilayah kerja UPK Puskesmas Khatulistiwa Kota Pontianak. *Jurnal ProNers*, *3*(1).

Sugiyono. (2017). *Metode penelitian kuantitatif kualitatif dan R&D*. Alfabeta.

Susanti, E., & Damayanti, N. N. C. (2022). Pengaruh hidroterapi rendam kaki air hangat terhadap tekanan darah pada lansia penderita hipertensi di Palembang. *Jurnal Media Keperawatan: Politeknik Kesehatan Makassar*, *13*(2), 2087–2122.

Warganegara, E., & Nur, N. N. (2016). Faktor risiko perilaku penyakit tidak menular. In *Nida Nabilah Nur | Faktor Risiko Perilaku Penyakit Tidak Menular Majority |* (Vol. 5, Issue 2).

WHO. (2021). *Hypertension*. World Health Organization. https://www.who.int/news-room/fact-sheets/detail/hypertension